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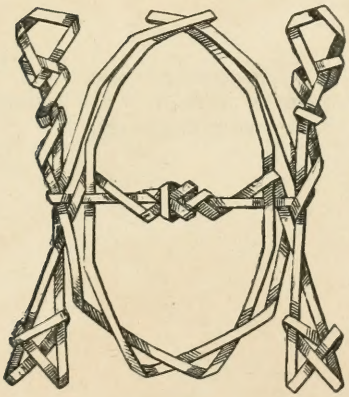
Ophthalmic Hospital Reports

AND JOURNAL OF THE

ROYAL LONDON OPHTHALMIC HOSPITAL.

1873.



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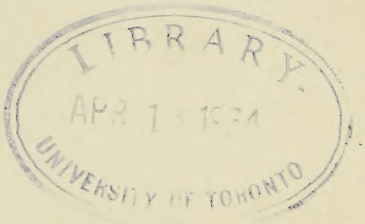

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Ophthalmic Hospital Reports,
and Journal of
Ophthalmic Medicine and Surgery.
Vol. VII. Part 1. February, 1871.

Part I.

Original Contributions.

CASES OF TEMPORARY ANCHYLOBLEPHARON.

(Reported from the Practice of Mr. Bowman.)

By Mr. C. J. Workman.

It is well known that, from the little resistance that the eyelids offer to any contraction of the skin in their neighbourhood during the process of cicatrisation, the upper or lower lid is not unfrequently displaced and its mucous lining everted. This is not only an annoyance to a patient but is also a source of danger to the eye when the ectropion is so severe that the lids cannot be closed. To the surgeon it has been a matter of difficulty to remedy such a deformity. In the first of the cases recorded below, Mr. Bowman conceived the idea that, if after releasing the tissues, he were to unite the upper and lower lids for a time, he would obtain a better effect than by simply performing a plastic operation. The result fully realized his anticipations, as the band of union between the two lids prevented to a great extent the upper one being drawn up again, while the tissues were cicatrising at the site of the plastic operation.

The success of this proceeding has led to its being adopted in another class of cases—that of palsy of the seventh nerve, where the patient is unable to close the eye, which in consequence suffers from constant exposure. Here, too, the result has been very satisfactory.

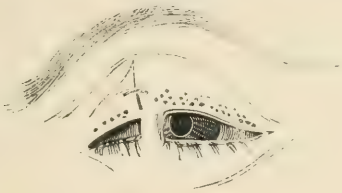
Amy R——, æt. 17, came to the Royal London Ophthalmic Hospital, in 1863, with a fistulous opening beneath the left eyebrow at the inner side. This Mr. Bowman found was connected with diseased bone, and he succeeded in removing two pieces of the ethmoid bone.

In November, 1865, she came again to the Hospital. The sinus had healed, and the cicatrix had so drawn upon the skin of the upper lid, that the inner third was everted, and the girl was unable to close the eye. Mr. Bowman performed a plastic operation, to release the skin in the neighbourhood of the cicatrix, and united the two lids near the middle of their margins for about $1\frac{1}{2}'''$ (Diagram 1).

In November, 1866, she was readmitted into the Hospital. The lids were firmly united by a band of skin, which divided the palpebral fissure into two parts; she was able to open the eye sufficiently to look out of each aperture. The tissues at the site of the old osseous disease were much laxer; another operation was now done, bringing the tarsal margin of the inner upraised one-third portion of the upper eyelid to the level of the outer two-thirds, but the band of adhesion to the lower lid was untouched (Diagram 2).

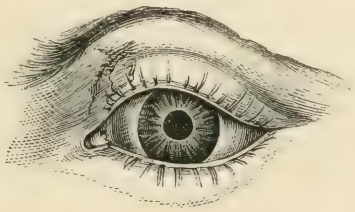
In February, 1867, Mr. Bowman divided the connection between the two lids, and at the same time did a further VY operation, in order to bring the tarsal margin to a lower level.

At the end of April the patient came to show herself; her appearance had much improved, and there had been but very



slight contraction of the tissues, so that on closing the eye there was but a very small chink between the lids.

She was able to read Jaëger 4 with this eye, the cornea of which was slightly nebulous, from an attack of inflammation when she was three years old (Diagram 3).



In December she came into the Hospital for a few days, when it was found that she could close the lids quite as well, if not better than in April, the tissues around not having contracted again since the union between the lids had been divided.

In the following case the cornea had commenced to ulcerate from being constantly exposed, but recovered after the lids were united.

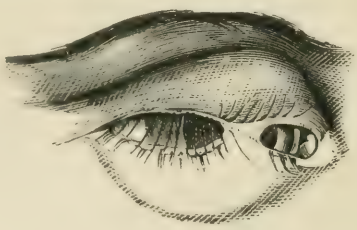
The case has an additional interest, as there can be little doubt but that the optic nerve was divided by the splinter of wood.

Valencia W——, æt. 5, came to the Royal London Ophthalmic Hospital on October 29, 1867, with an orbital abscess following an accident. Her father stated that, a short time before, she fell down, striking the right eyelid against a hoop stick. The child was placed under chloroform, and Mr. Bowman made an incision

beneath the brow; the exciting cause of the abscess was found to be a piece of wood, which had become embedded in the orbit.

In June, 1868, the following was the patient's condition :— There was an unsound cicatrix below the right brow, and the upper lid was drawn up, so that the eye could not be closed. The globe itself was injected and pushed forwards, and a little downwards. On the cornea was an ulcer to the inner side of the pupil, and this was accompanied by onyx. To prevent any more retraction of the upper lid, and also to protect the cornea, Mr. Bowman pared the edges of the lids about the middle, for about an eighth of an inch, and united them by two stitches; before doing this he made an incision along the site of the cicatrix, so as to release the skin a little, and also to examine with a probe whether there was any more wood or dead bone; but nothing was removed.

At the end of June, ten days after the operation, the lids were firmly united, and the upper one already elongated. There was a good deal of discharge from the opening below the brow. April 9th, 1869, she was brought to the Hospital to be seen, before her father and his family went to Chicago. The sinus which had existed had closed some six or eight weeks, but the tissues did not seem thoroughly sound. The lids were united by a band, as seen in Diagram 4.



The child could not perfectly close the eye, but this had recovered as far as the ulcer of the cornea was concerned, a slight opacity being the only trace left. She has never had any perception of light since the accident, and it seems probable that the splinter of wood had divided the optic nerve. With the ophthalmoscope the nerve was seen to be completely atrophied.

Mr. Bowman thought it advisable to postpone the division of

the band, as the cicatrix at the site of the necrosis was not yet sound, and there was a chance that the lid might be displaced again.

The next case is an illustration of the advantage derived from uniting the lids in a case of paralysis of the portio dura, and by this means preserving the eye from irritation during recovery.

In May last Mr. Lawson united the lids in a woman at the Hospital who was suffering from facial palsy and paralysis of the orbicularis. In consequence of not being able to close the eye, it had become inflamed, and caused the patient a good deal of annoyance. In two months' time she had recovered a good deal of power in the orbicularis, though the facial palsy persisted. The general condition of the eye had much improved, and the patient said that the operation had been a great comfort to her. As she could now nearly close the eye herself, Mr. Lawson divided the band of union.

The illustrative woodcuts, Nos. 3 and 4, were kindly made by Mr. Fairlie Clarke.

[Note by Mr. Bowman.—In this operation of uniting the eyelids for a temporary object, care must be taken not to interfere with the subsequent integrity of the tissues at the tarsal margin. If delicately done, it will be found sufficient to shave off a very thin slice of the opposed margins along the line of the Meibomian orifices, not including that of the cilia. Very fine threads should be used, and should extend beyond the bare surfaces, and take a good hold of the edge of the lid, so as not to cut themselves out. They should be removed on the 5th to the 8th day.]

ON LEAD-POISONING AS A CAUSE OF OPTIC NEURITIS.

By Jonathan Hutchinson, F.R.C.S.

The following cases are of interest as examples of inflammation of the optic nerves induced by lead-poisoning. The fact that lead will sometimes produce amaurosis has long been known, but until the use of the ophthalmoscope we had no knowledge as to the precise manner in which it was brought about. Some authors appear to consider that the defect of sight is usually due to ciliary paralysis, but most admit that occasionally at least it is a true "amaurosis."

Mackenzie writes, "Lead colic is not unfrequently attended by amaurosis, as well as by deafness, vertigo, delirium, epilepsy, and other nervous symptoms," and further, "the purgative plan of curing lead colic is generally successful in removing the amaurosis which sometimes attends it."

Periera, quoting chiefly from Tanquerel des Planches, mentions various cerebral lesions, but says nothing of amaurosis.

Stelwag von Carion writes, "Yet it is certain that lead poisoning may cause true amaurosis. It has been occasionally seen to arise after very severe headache, while other nervous symptoms are wanting, and again disappear (Hirschler), but in other cases it has become permanent (Rau). It is generally developed after repeated attacks of colic, or other symptoms of lead poisoning. It then occasionally occurs quite gradually, and is soon combined with atrophy of the optic nerve, recognised by the ophthalmoscope. More frequently it appears suddenly with other alarming nervous symptoms during an acute attack of lead poisoning, and then generally leads to complete blindness, which may be either temporary or permanent."*

* Translation by Drs. Hackley and Rosse, p. 668.

Mr. Bader briefly states, under the head "Atrophy of Optic Disc," "Gradual loss of vision, extending over months and years is observed in cases of poisoning with lead, arsenic, tobacco, &c." He appears to consider its action analogous to that of tobacco, slow, and resulting in atrophy without preceding inflammation.

Mr. Soelberg Wells writes, "The absorption of lead into the system will produce amaurosis. I have only met with one case in which the loss of sight could be distinctly traced to lead poisoning. This was in a young woman, who a few months ago came under my care at Moorfields. She had been a worker in lead, and had suffered from severe lead poisoning. She was completely blind, and both optic nerves shewed marked symptoms of atrophy consecutive upon optic neuritis. Mr. Hutchinson has mentioned to me that he has seen similar instances." From Mr. Wells's subsequent statements I infer that he has seen other cases not so severe as the one mentioned, and of which "congestion and hyperæmia" were the chief objective symptoms.*

Neither Mr. Power nor Mr. Macnamara mentions the subject, and the French translators and annotators of Mackenzie's work do not add to the original.

CASE I.—*Severe Lead Poisoning—Double Optic Neuritis, with the usual Symptoms.*

The following case I have already published in these reports (see vol. vi, page 55). It will be for the reader's convenience, however, briefly to recapitulate its facts.

* As an instance of the annoying carelessness with which index makers often do their work, it may be mentioned that the word LEAD does not occur in the index in any of the ophthalmic works from which I have quoted, excepting that of Mr. Wells, and that in the latter there are references to "lead on the cornea," and "lead, acetate of;" but, curiously enough, none to *lead as a cause of amaurosis.* You have to look up "*Amblyopia saturnina*" to find the extract which I have given. Authors, in justice to themselves, really ought to look better after those to whom they entrust the making of the indices to their books.

The patient, a young woman, æt. 19, had been in total darkness for nine or ten weeks. She had begun to work in a lead mill two years before, but had not experienced any inconvenience till the last four months. She had had to handle lead, and had never taken any precautions. At the time mentioned she was admitted into the London Hospital for colic and slight paralysis of the extensors of the wrists. She recovered well, and went back to her work, till she began to be very sick and suffered from severe pain in the back of the head, and gradual failure of sight.

Both discs showed the usual conditions of optic neuritis, being covered with lymph. There were also numerous small apoplexies near them.

Case II.—*Double Optic Neuritis in connection with Lead Poisoning, but without other Symptoms—Constitutional Symptoms of Neuritis ill-marked—Description of the Discs.*

William Argent, æt. 40, has been a house-painter for twenty years past. He is now a pale complexioned man, and around his teeth is a very marked blue line. He asserts, however, that he has never suffered from lead colic, nor from any other illness which he attributed to the paint. In November, 1867, he was laid up for three weeks with "rheumatics," and had swelling of the backs of hands, great toes, and ancles. Often before that he had suffered from rheumatic pains in various parts. His sight has never been quite what it was since this illness. Two or three months ago, however, it failed more decidedly, and he now found that his left eye was much worse than the right. He has for the last few years often suffered from pain in the head, which he considered rheumatic; it appears to have been a frontal neuralgia. At the time his sight was decidedly failing he had not more headache than usual, nor was there much tendency to sickness. During the last two or three months he has, however, almost always had sickness (to vomiting) once or twice a week. This is a symptom quite new to him.

He applied to me first on February 8th, 1869. I found that with his left he could only see to spell out No. 16, and with the right No. 4. The disc of the left was very pale, and of a blue-white, whilst the vessels were much reduced in size, the arteries being so

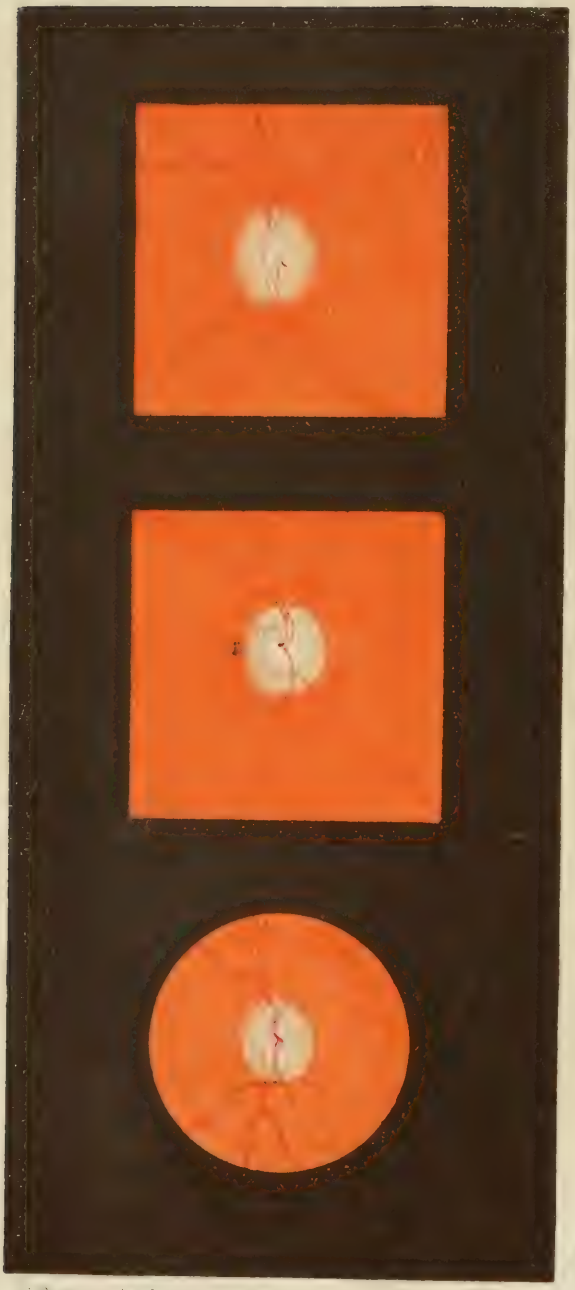


Fig. 1.

Fig. 2.

Fig. 3.

H. Burgess del. ad nat. et lith. Bell. W. West imp.

NEURITIS FROM LEAD-POISONING.

small that they could scarcely be traced. The margins of this disc were quite clear. The disc of the right was white in its nasal (inverted) half, and on the outer part was covered with pale lymph, which concealed its edges. The quantity of lymph, however, was very much less than is usual in many other forms of neuritis. Although headache and sickness have been but slightly marked during the neuritis, yet it is quite certain that they have been present to some extent.

In the left eye the margins of the disc are very definite, not in the least jagged. There is a single minute dot of pigment on the inner side, but with this exception, there is no evidence of disturbance of the choroid. The retina is quite clear at all parts. In the right there is no evidence of choroidal implication. The retina is hazy to a slight extent round the disc, but not to any great distance.

His smell and his tactile sensibility seem perfect.

He has sometimes seen flashes and sparks of light before his eyes.

Reference to Plate.

Figs. 2 and 3, Plate I, show the ophthalmoscopic appearances in the two discs of this case.

Amongst the peculiar ophthalmoscopic features of plumbic neuritis we may mention (a) the small amount of lymph usually present; (b) the absence of colour in the lymph; (c) the absence (not invariable) of extravasations of blood; and (d) the early and great diminution in size of the arteria and vena centralis. The choroid does not appear to be in the least implicated.

CASE III.—*Acute Lead Poisoning with Optic Neuritis—Recovery of Health, but with Permanent Blindness.*

Mrs. Driscoll, æt. 25, came to us at the Moorfields Hospital, January 7, 1870, having been almost totally blind since an acute attack of lead neuritis four years previously. The evidence she gave us was the following. She went to work four years ago in a lead factory, being at the time in perfect health, and having never before been employed in that way. After six months' employment in the factory she became very ill, had pain in the head, and severe sickness. Her illness was attributed to her work in lead. She was confined at home for a month with these

symptoms, and became at the same time almost blind. The sight failed suddenly and quickly. She had no dropped wrist. When she recovered from her illness the state of her sight was such that she could not return to work. Since that time (4 years) she has never been exposed to the influence of lead, and has enjoyed fair health. Her sight has, however, scarcely improved at all.

State of Vision and Ophthalmoscopic Appearances four Years after the Attack (*January 4th*, 1870).—She cannot distinguish a gas flame in a dark room, but she asserts that sometimes she can just see light. Both eyes are alike. She is of dark complexion, but pale. With the ophthalmoscope the conditions in the two eyes are found to be exactly alike. The media are quite clear and the fundus is easily seen. In each the disc is quite white. The arteria centralis is diminished to perhaps half its natural size, the veins being much larger. The lesser vessels, which give pink tint to the normal disc, have wholly disappeared. Near to the discs the trunks of the vessels are decidedly obscured, as if from past inflammation, and there are in places white lines along their trunks. (Fig. 3 in Plate.)

Case IV.—*Hereditary Gout increased by Lead Poisoning—Neuritis of the Left Optic Nerve in* 1867 *resulting in Permanent Blindness—Neuritis of Right Optic Nerve in* 1870 (*still under treatment*)—*Interesting Facts as to Asymmetry of Symptoms.*

John West, æt. 44, a painter by trade, was admitted under Mr. Hutchinson's care at the Royal London Ophthalmic Hospital on September 29, 1870. About three years before this he had been under Mr. Dixon's care for failure of his left eye, when he was told that he had "atrophy of the nerve." This eye became at that time all but blind. He applied on the second occasion on account of the right eye, which had been failing gradually for about three months.

On examination his vision was found to be, for the *right* eye, 20 J. (increased by a convex glass to 7 J.) and $\frac{20}{200}$; with the left he could only see the light. There was contraction of the outer part of the field in the right eye. With the ophthalmoscope it was found that the *right* disc was of a dirty grey colour, its margins "fluffy" and ill-defined, and the large vessels somewhat diminished. The left disc was in a condition of advanced

white atrophy. A blue line was found on his gums, and the gums were much wasted.

The interest of this case lay in the *cause of the neuritis*, and in the occurrence in *the same patient of optic neuritis, lead colic, and gout.* His family and personal history was as follows:—His paternal grandfather was "a martyr to gout;" he was a stout man, a hairdresser, and drank beer. The patient's father was a plumber, and he also suffered from gout. The patient, a painter, had his first attack of gout sixteen years before admission, in his left great toe; since that time he had had many attacks; the left side seemed to have suffered more severely than the right, and he stated that his left arm and leg had often been rendered quite useless by the gout for a month or two together. His attacks of gout had usually been unsymmetrical; they came on suddenly, and often at night; the affected joints were swollen, shining, red, and painful. He had suffered repeatedly from colic, but never from "wrist-drop." As to the cause of his attacks of gout, he said that he had never drunk much beer, and but very little spirits; he had always found that an attack of gout came on after he had been "flatting colour." In "flatting" the work is done in closed rooms, the colour is entirely lead, and is mixed with pure oil of turpentine, a liquid which evaporates quickly, and probably in this way carries off more vapour of lead in a given time than the less volatile liquids used in ordinary painting. He stated that the "flatting" often produces a sort of intoxication, especially in the men who work highest up in the room, and is frequently followed by attacks of colic. He himself had had no colic for five years, and he attributed this exemption to his having worn a moustache during that time.

It is interesting to notice that the eye which failed first was on the side of the body which was earliest and most severely attacked by gout.

One of my most instructive cases in reference to this subject came under my notice at the Newcastle Infirmary, during the visit of the British Medical Association last August. The patient was under Dr. Charlton's care, and I am indebted to him, not only for permission to examine it, but also to make public use of its facts. Dr. Charlton told me that he had seen several cases of loss of sight from the effects of lead.

Case V.—*Acute Lead Poisoning, with Imbecility and General Paralysis—Double Optic Neuritis—Complete and Permanent Blindness—Recovery of other Functions under Treatment by Iodide of Potassium.*

Kate Morgan, æt. 19, came to Newcastle in September, 1869, and engaged herself in the lead works. Her occupation consisted in carrying white lead. In about four months she began to suffer from symptoms of poisoning. Her bowels became costive and her muscles weak. Her sight also began to fail, and in five weeks from its first defect she was quite blind. When, in the beginning of May, she was admitted into the infirmary under Dr. Charlton's care, her state was most deplorable. She was wholly blind, unable to speak distinctly, paralysed in all limbs to the extent that she could not use them, and liable to incontinence of both urine and fæces. Her expression was that of an imbecile, and in addition to her defect in vocalisation, there seemed also to be inability to find her words. There was a distinct blue line around the gums.

When I saw her in August, she had been three months under treatment by iodide of potassium and sulphate of magnesia—the former in full doses. She had for six weeks been able to leave her bed, and she could now walk well. Her face had regained an intelligent expression, and she could speak clearly. The incontinence had disappeared. She remained, however, still quite blind. Dr. Page, the house surgeon, who supplied me with the above facts as to her case, kindly procured me also an opportunity for ophthalmoscopic examination. I found the discs both in the same condition of atrophy after neuritis. They were blue white, of a somewhat dirty appearance, and the central vessels had much diminished in size. There were still traces of lymph about the main trunks. At a distance from the discs there were no deviations from the healthy state.

In this case it is evident that the poisoning went very near to a fatal termination.

The girl had probably been very careless in her habits, and had thus obtained an unusual dose of the metal. The result of the treatment was most marked, and most satisfactory. If we ask why the other nerves recovered their functions so much more fully than did those of sight, we shall be obliged to give

a hesitating answer. Possibly the strength of the sheath surrounding the optic nerves renders inflammatory swelling more injurious to them than it is to others. It is possible, however, that the cause of the paralysis of the limbs was a central inflammation rather than a neuritis. As to what had occurred in the eyes, there could be no room for doubt, especially when we compare it with the other cases which I have recorded.

PUNCTURED WOUND OF THE SCLEROTIC, WITH ESCAPE OF VITREOUS, TREATED BY CLOSING THE WOUND WITH A SUTURE.

By George Lawson, F.R.C.S.,

Surgeon to the Royal London Ophthalmic Hospital, and Assistant-Surgeon to the Middlesex Hospital.

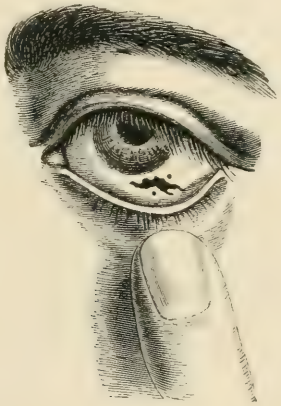
In punctured wounds of the sclerotic there is frequently a difficulty in obtaining direct or primary union, and this is especially the case if the wound be in the lower region of the eye, and there be a loss of vitreous at the time of the accident.

This occasional apparent incapacity to unite arises solely from mechanical causes, and not from any defect in the reparative powers of the sclerotic coat itself. From the cup-like shape of the sclerotic, and from its peculiar inability to adapt itself rapidly to a diminution of the contents of the globe, there is always a tendency for the lips of a wound in this structure to gape if there be also associated with it an escape of vitreous.

When there is a loss of vitreous from a punctured wound of the sclerotic in the lower region of the eye, the vitreous is very apt by mere gravity to continue to drain through it, and thus to keep the edges of the wound apart, by preventing the eye being again plumped out by an abundant secretion of aqueous. If, however, the wound in the sclerotic be closed by a single fine suture, and the escape of the vitreous be arrested, union of the cut edges will rapidly follow. The suture should be of the finest silk, and to each end of it a small needle should be fastened, so as to allow of the silk being drawn through each edge of the wound separately, and from *within* outwards.

W. G., æt. 40, came under my care at the Royal London Ophthalmic Hospital on March 5th, 1869, having a few hours

previously met with the following accident:—Whilst engaged breaking stones, a fragment of stone flew up, and struck him on the left eye, causing a jagged wound in the sclerotic in the lower part of the eye, at a short distance from the cornea. There had been evidently an escape of a small quantity of vitreous. The wound presented the appearance represented in the woodcut; it was gaping, and its lower edge was prominent, and stood away from the upper margin, which was somewhat depressed. From the man's account it was clear that there was no particle of stone lodged within the eye.



As it was clearly impossible to bring the edges of the wound together without a suture, I introduced a single thread through the points marked in the drawing, and brought the divided parts into apposition. The patient progressed most favourably, and the wound completely united; the presence of the stitch produced no irritation.

On April 27th, this man came to show himself at the hospital. There was no redness of the eye, which seemed to have recovered completely from the accident; but on testing his vision he could only count fingers, and on examination with the ophthalmoscope an extensive detachment of the retina was seen to correspond with the site of the puncture. This was no doubt due to hæmorrhage between the choroid and retina at the time of the injury.

CASE OF SYMPATHETIC RETINITIS PIGMENTOSA.

By D. Argyll Robertson, M.D., F.R.C.S., Edin.

The following case is, I believe, a true example of sympathetic ophthalmia, although the character of the inflammation differs from that which we usually observe resulting from sympathetic irritation; for while this disease is usually characterised by plastic inflammation of the iris, extending back to the ciliary processes and choroid, this had as its chief feature retinal inflammation with pigmentary deposit.

On the 6th of August, 1868, I was consulted by John Haig, a blacksmith, æt. 61, on account of dimness of vision.

He stated that his sight was good till about four years ago, when he received a blow on the *right* eye from a piece of stone. After he had recovered from the inflammation which attended this injury, he found that the sight in that eye was very dim, but was much improved by a cataract glass which he accidentally applied to it. He also noticed that when he stooped a dark body fell across the sight and blinded that eye, but that on looking up vision returned. He further stated that although he could, while looking in front of him, observe objects on the ground, those much above the level of the eye were obscured by a black or red cloud, which he said appeared about as big as a farthing. For several years the sight in his *left* eye has been growing dim, all objects appearing to be obscured by a thick mist. Cataract glasses afforded no improvement to this eye. He was thus compelled to depend for vision upon his right eye, which, when aided by a cataract glass, sufficed to enable him to follow his occupation and even to read moderate sized print.

About 13 months previously he had received a severe blow with a hammer on the right supra-orbital ridge, after which he had severe inflammation in the right eye. He was positive, however, that the hammer did not strike the eye. His sight was very dim after this accident, and four or five months elapsed before it became nearly as clear as it had previously been, but since then the

sight has again become gradually more and more obscured. He now complains of muscæ volitantes, and that while he can see pretty well in bright daylight, that in the dusk of evening or early morning he is almost completely blind, and that then he sees better with the left than with the right eye.

On examination of the *right* eye, I found that the plane of the iris was deeper than usual, the pupil balloon-shaped, and drawn to the outer and upper edge of the cornea, where there was a small cicatrix, to which the iris was adherent. The iris was very tremulous, quivering on the least movement of the eye, and the pupil did not act at all, or only very slightly, under the stimulus of light. The tension of the eye was normal.

In the *left* eye there was deep-seated opacity of the lens, involving the posterior capsule. The iris was tremulous, the tension of the eye natural.

With the *right* eye, to which a convex glass of 4 inches focus was applied, the patient was able to read No. 4 of Snellen's types, at from 9 to 12 inches distance.

The pupil of the left eye was dilated, whereby the patient stated his sight was much improved. With it he was able to decipher some of the letters of No. 7 of Snellen's types.

On examining the field of vision, it was found to be markedly contracted in both eyes. The extent of field of vision of the *right* eye at one foot distance was:—

To the outer side, 8 inches.
„ inner „ $2\frac{1}{2}$ „
Downwards ..... $1\frac{1}{2}$ „
Upwards ..... $2\frac{1}{2}$ „

while in the left it measured between 4 and 5 inches in each direction.

On reflecting the light with the ophthalmoscope into the right eye a white body was observed occupying the lower part of the vitreous chamber, and which, on the patient moving the eye upwards, and then downwards, floated up and down in the vitreous humour. This was evidently an opaque dislocated lens. The optic nerve was observed to be slightly atrophied, and the arterial vessels somewhat diminished in calibre. Around the optic entrance there was a large patch of choroidal atrophy of irregular shape, leading upwards to a track of partially atrophied choroid. The periphery of the fundus exhibited all the characters

of retinitis pigmentosa, there being numerous deposits of pigment, chiefly stellate, and most marked in the neighbourhood of the larger branches of the retinal vessels. The retina and choroid appeared healthy in the neighbourhood of the macula lutea.

The ophthalmoscopic examination of the *left* eye was rendered very difficult by the extent of the opacity of the lens, but I was able to detect a degree of atrophy of the choroid, especially at the entrance of the optic nerve, while pigmentary deposit into the retina was very well marked in the equatorial region, especially at the inner side, but not to such an extent as in the other eye.

Some of the symptoms in this case deserve a word of explanation.

The improvement in vision that resulted from the use of a cataract glass indicated that the blow on the right eye had given rise to dislocation of the lens; and the sudden obscuration during stooping was explained by the falling forwards of the opaque lens into its natural position behind the pupil whereby the access of light to the retina was prevented. The lens when lying at the foot of the vitreous humour prevented the rays of light from objects above the horizontal plane from striking the retina, and thus the upper part of the field of vision was darkened. The presence of hemeralopia and the excessive concentric contraction of the field of vision in both eyes at once, led to the suspicion of the existence of retinitis pigmentosa, which ophthalmoscopic examination verified.

From a consideration of the history of the case, I am inclined to adopt the following view with regard to the sequence of the pathological processes and their relation to one another.

The blow from the stone to which he ascribes the origin of all his troubles, must have occasioned a rupture of the suspensory ligament of the lens and dislocation with subsequent opacity of that structure. In its new situation the lens acted as a foreign body, giving rise to irritation of the adjacent structures leading eventually to pigmen-

tary inflammation of the retina. The irritation thus caused did not merely affect the wounded eye, but by sympathy involved the other, inducing there a similar inflammation to that which existed in the injured eye. Further, the opacity of the lens in the left eye may, I think, at any rate in part be viewed as secondary to the inflammation of the retina and choroid, as it presented much of the appearance of that cataract which is caused by defective nutrition, the result of deep-seated disease, more especially atrophy of the choroid.

This I consider the most feasible explanation of the different pathological changes, although, as far as I am aware, no case has been reported in which pigmentary retinitis has been ascribed to any source of irritation, either direct or sympathetic. But it is most natural to conclude that the dislocated lens might in the above case, from some idiosyncrasy, induce this form of inflammation, although we know that in other instances a dislocated lens gives rise to an inflammation of a different character.

Professor von Graefe has recently reported two cases of sympathetic inflammation which bear considerable resemblance to the case I have narrated.

The first occurred in a man aged 35, who from birth had been blind of his left eye, which had only lately become painful, in consequence of the dislocation of a calcareous lens into the anterior chamber. His right eye was sensitive to the light, but otherwise healthy. Von Graefe removed the dislocated lens, and the wound healed thoroughly, but the eye remained irritable and tender to the touch, and eventually plastic inflammation of the ciliary processes and choroid ensued.

Six weeks after the operation the sight of the other eye became suddenly impaired. On ophthalmoscopic examination this impairment was found to be due to simple serous inflammation of the retina. Subsequently the eye became affected with iritis serosa and paralysis of the accommodation. After this had lasted for several weeks the disease subsided, and the sight became almost as perfect as it had been before. This good result von Graefe attributed to abatement in the irritability of

the other eye. Ophthalmoscopic examination now exhibited some slight alterations in the choroidal coat.

In the second case, the patient was 20 years of age, and had been blind of the left eye from childhood. This eye had latterly become painful, and dimness of sight had manifested itself in the right eye. On examination of the left eye the retina was found completely detached from the choroid, and the globe was sensitive to the touch. The right eye was found to be affected with slight serous retinitis; some limited opacity of the vitreous humour, and a few spots of choroidal inflammation about the equator of the globe.

The left eye was enucleated.

Examination of the removed globe revealed detachment of the retina, and a calcareous deposit on the inner surface of the choroid.

The operation was followed by improvement in the sight of the other eye, which, however, was not complete when the case was reported.

These two cases, although agreeing in their main features with the case I have reported, differ from it in respect that the inflammation was of a purely serous character, and unattended with the deposit of pigment in the retina; further, that while in my case the inflammations caused by direct and by sympathetic irritation affected the same texture and induced a similar morbid action, in the others the primary disease differed more or less in character from that secondarily induced.

I have only further to remark that I did not consider any treatment advisable, as the eye primarily diseased was the one with which the patient saw best, and it was very doubtful whether the removal of the one would have materially improved the condition of the other eye. I therefore contented myself with advising that belladonna drops be applied so as to keep the pupil dilated. This gave him sufficient sight to pursue his occupation.

THE TREATMENT OF SÄMISCH'S "ULCUS CORNEÆ SERPENS."

By Dr. Hermann Pagenstecher.

A treatise, by Sämisch, upon the Ulcus Corneæ Serpens and its therapeutic treatment, lately published, has doubtless been received with the greatest interest by all members of the profession. The observations therein contained, but more especially the results obtained by the course of treatment propounded are of importance, great in proportion to the difficulty with which we have hitherto had to contend in dealing with this malady, so frequently irresistible despite our best healing appliances.

Sämisch designates by the name "Ulcus Serpens," that malady which develops itself frequently from injury, but sometimes spontaneously at, or occasionally a short distance from, the centre of the cornea. In the beginning of the malady a grey, generally circular, opacity of the cornea presents itself; in the place of this a loss of substance at first of slight depth, becomes apparent; some portion of the edge of the ulceration now swells, and becomes of a greyish-white colour; it is at the seat of this swelling that the ulceration tends to creep along. Simultaneously with its gradual superficial increase, the ulceration acquires also a gradual increase of depth, until the process terminates in leucoma—when the case is favourable—or in perforation, staphyloma, or anterior phthisis. In the great majority of cases hypopyon occurs. Conjunctival and subconjunctival injection, photophobia and lachrymation always occur in greater or less degree. Iritis always ensues, and occasionally iridocyclitis also.

Ciliary neuralgia occurs; in many cases it is of long continuance and violent, in others it lasts but a few days.

Hence it appears that this is the malady commonly

known as *hypopium-keratitis*, when there is hypopyon of the anterior chamber, or as *keratitis superficialis ulcerativa*, when no such hypopyon exists.

However unimportant, as a rule, may be the name given to any malady, the adoption of this name "Ulcus Serpens" may, from a clinical point of view, be well justified: 1st, because a special mode of treatment is now associated with this name; 2nd, because the word "serpens" more directly calls attention to the essential character of the ulcer.

Until very lately the almost universally acknowledged remedies against this malady—atropine, warm fomentation, and the greatest possible repose of the eye by means of the pressure-bandage, were resorted to at the Ophthalmic Hospital of Wiesbaden. In many instances these remedies were attended by favourable results; but unfortunately the percentage of instances in which the course of the disease terminated in leucoma-adherens, in glaucoma, or even in complete atrophy was by no means what might have been desired. Independently of the fact that the wet, warm fomentations, and the pressure-bandage, were in some instances found to act in other respects injuriously, and that these remedies necessarily superinduce much washing and personal inconvenience, it was found sometimes with the best possible precautionary measures, impossible to stay the ulcerating process; and often the march of the disease was unchecked until finally perforation of the cornea with all its evil consequences had ensued.

In presence of such results Hofrath Dr. Pagenstecher resolved upon trying the operation so warmly recommended by Sämisch, the "keratotomie" (incision of the cornea). He has performed this operation already in twelve cases.

Assuming this number of examples to be too limited to justify the formation of a final judgment, still the surprising rapidity and certainty with which, almost unex-

ceptionally, the progress of the malady was arrested, warrants the hope on his part that other members of the profession will submit this operation to more extensive trial.

The observations which, in following this system of therapeutics, we have had opportunities of making may, so far as the main point is concerned, be reduced to the following:—

1st. The ulceration on the cornea is arrested in its progress, and retained within its already acquired limits. The clouding of the cornea, so inimical to the sight, is thus reduced to the utmost possible minimum.

2nd. The base of the ulcer is cleansed, and becomes more transparent, and the existing infiltration, limited to one side, disappears totally after a few days. In one instance we noticed this to have taken place at the end of 24 hours, in another at the end of 36 hours.

3rd. Hypopyon, when such existed, or the particles clouding the aqueous humour, were to a very great extent at the time of the operation emptied out, and the absorption of such particles as remained behind, was much accelerated. Hereby one danger, frequently unavoidable under other modes of treatment, is frustrated; the organization of these elements, and the closing of the pupil thereby often occasioned, or its adhesion to the anterior capsule is much diminished.

4th. The irritation of the iris decreases rapidly; and in cases submitted to treatment at an early period a very favourable mydriasis is seen soon to set in.

5th. Ciliary-neuralgia, when present, is completely allayed, if not immediately, within a very few hours.

In performing the operations, Sämisch's directions were strictly followed. A simple incision, made with Graefe's narrow knife, slit the base of the ulcer, and this slit was made to extend, on both sides, beyond the edge of the ulcer into the adjoining healthy texture. The greatest care was taken to place the incision if possible, so that the

slit might not directly intrude upon the field of the pupil's operations.

In none of the cases thus treated did any accident occur during the operation, although twice the aqueous humour was seen to flow very suddenly, as in a stream from the anterior chamber. Twice a slight bleeding was observed to ensue in the anterior chamber; but whether this should be ascribed to newly-formed vessels or to rupture of a vessel in the iris from the sudden diminution of pressure, it was not possible to decide. The water that flowed from the chamber was always more or less clouded, and portions of hypopyon, when any existed, were generally discharged together with particles of fibrous matter. Should the iris immediately after the operation become prolapsed into the wound, it may in general be replaced after a few minutes, by means of a slight friction upon the cornea with the upper or lower eye-lid.

The first result of the operation manifests itself in many cases by an almost instantaneous cessation of the most violent ciliary neuralgia; in other cases this neuralgia seems to become intensified for the space of a quarter or of half an hour, and then to give place to a soothing sensation; sometimes, but seldom, the neuralgia lasts longer and only yields to a repeated evacuation of the aqueous humour.

The after-treatment, in which we swerved but very slightly from Sämisch's directions, consisted in the application of a wet compress, in atropine drops applied at intervals of one or two hours, the application of a pressure bandage during the night, and, what is the most important part of the whole proceeding, in the keeping the wound open, or rather in repeatedly reopening the wound during the following days.

The pressure bandage was in all cases worn without inconvenience, and we think that, independently of the experience that the healing process is facilitated by the

immobility thus produced, we may further justify its application by the fact that the patient is thereby kept from involuntarily rubbing the eye during sleep. This appears to us of especial importance, because after the outflow of the aqueous humour, a prolapse of the iris, injury of the zonula zinnii or hyaloidea might very readily be occasioned. No one who has had accidents of this nature after cataract operations, will consider this to be an exaggerated precautionary measure, although the eye be free from pain.

Very often, in the evening of the same day on which the operation was performed, and immediately before laying on the pressure bandage, we have again evacuated the aqueous humour. This is commonly effected by means of a gentle pressure with the upper or under eye-lid upon one of the edges of the wound; when this pressure fails to produce the desired effect, a probe is used. In very rare cases, when the adhesion has already acquired some solidity, a forcible reopening by means of a silver hook or similar instrument has been resorted to. In not one of the cases that have come under our observation was any increase of the ulceration perceptible on the following day; the ulcer itself in all cases presented a cleaner appearance; the infiltrated edge had in some cases become thinner, and in two cases, after the lapse of 24 and 36 hours respectively, had totally disappeared; hypopyon, when it had previously existed, was no longer perceptible, while at the same time the pupil was more widely dilated. On the following days we have pursued the same course, clearing the chamber of aqueous humour twice or thrice daily, according to circumstances, and at night applying the pressure bandage.

Here the question presents itself, for how long should this treatment be continued? or, what indications should determine the moment for finally closing the wound? Sämisch advises that the treatment be continued until reparation of the ulcer has begun; until no trace of opacity

can be seen at the edge; until no trace of clouding can be found throughout the field of ulceration elsewhere than in the immediate vicinity of the wound. This, he says, will on an average be in the third week. We have not, in general, continued the reopening of the anterior chamber so long as this, partly because we judged that the process would thus be needlessly prolonged; partly—and this was our guiding principle in nearly all cases—because the cessation of the progress of ulceration, and the reparation of the ulcer, seemed to us to set in at an earlier period. Accordingly in some cases we kept the wound open during four days only, in others six or seven days, and in but one case eight days. I would call attention to the fact that in many cases we caused discharge of the aqueous humour twice and even thrice in one day. I must also state that in one case, where we suffered the wound to close on the fifth day, we were, after eight days, in consequence of relapse, obliged to do a new operation. In this operation the new slit was made at a right angle to the old one, and a seven weeks' treatment, the same as that followed in the other cases, ended in a very good result. Sometimes after the closing of the wound, when the symptoms of irritation were abated, we used with much advantage the yellow ointment, and found that this contributed not a little to the clearing of the part of the cornea affected.

The results of this treatment may be summed up as follows. In every case we were able to dismiss the patient with a more or less dense clouding of the cornea (generally of the same superficial extent as that of the ulcer), the scar of the wound being marked by a deeper opacity.

But this cannot be considered very injurious to the sight, as the scar principally lies in a diffuse corneal-opacity well capable of dispersing the light.

Minute reports respecting the duration of the treatment in the hospital would of course exhibit great variety;

naturally this duration must depend upon the nature of the malady, the individuality of the patient, and his temperament. For this reason average numbers are of but little value. All that can be affirmed with certainty is, that the final result is obtained by following this course of treatment in a much shorter time than has ever been attained by the courses heretofore pursued. The results already attained are sufficiently encouraging to induce us to apply the same remedies to future cases; and if by greater experience the certainty of success be, as is very probable, more firmly established, we may look upon this mode of treatment as a very important acquisition, certain to reduce to a very small percentage the cases of total leucoma, and of other sad results.

Besides the twelve cases above alluded to, this operation was resorted to in another case which cannot strictly be classed, according to Sämisch, as one of ulcus serpens. In this case we had to deal with two small but somewhat deep sores, partaking rather of the character of deep inflammatory pus-infiltrations. As every remedy usually resorted to against maladies of this class proved ineffectual, and the sore still continued to extend both in surface and in depth, a keratotomy was done, and the result was as favourable as could be expected. I shall presently report this case with all its details, but it may be better first to give as illustrations, the two following cases of *ulcus serpens* in which the reparation of the ulceration took place in a strikingly rapid manner.

Case I.—George B——, æt. 62 years, shoemaker, presented himself, the first time, on the 27th May, 1870. He states that during ten days he has felt very ill at ease in the left eye. The affection has up to the present moment steadily increased. His chief sufferings consisted of a severe ciliary neuralgia, particularly bad during the night, great photophobia, and constant lacrymation. A circular rather superficial loss of substance of about four mm. diameter is situated a little below the centre of the cornea. The surface is of a greyish hue, the inner margin is

bounded by a bright yellow zone about one mm. in width. The aqueous humour is rather clouded, the iris discoloured, the pupil contracted and sluggish. There is a slight hypopyon at the lower part of the anterior chamber, much conjunctival and subconjunctival injection.

On the same day the base of the ulceration was severed by a linear slit, made with Graefe's narrow knife, of about six mm. in length. This was followed by an escape of aqueous humour, clouded, and interspersed with fibrous matter, and a slight discharge of blood into the anterior chamber.

Ordered: one drop of atropine solution every hour, and moist compress.

Within twenty minutes after the operation the ciliary neuralgia had altogether ceased.

In the evening a second discharge of the aqueous humour, and at night the pressure bandage.

28th May.—Sleep good, ulcer still of the same size, hypopyon has disappeared, but little blood in the anterior chamber. The aqueous humour was three times discharged in the course of this day, in the morning, at noon, and in the evening; moist compress and atropine in the intervals, at night the pressure bandage.

29th May.—The inner yellowish zone has completely disappeared, and the whole place presents a somewhat transparent aspect, although still grey. The edges of the wound are slightly puffed. To-day the aqueous humour was again discharged three times; atropine every two hours. A favourable mydriasis ensued, which set in as soon as the anterior chamber had reformed. Conjunctival and subconjunctival injection considerably abated. At night the pressure bandage.

30th May.—The whole surface of ulceration presents to-day a clearer and more pellucid appearance. By slight pressure on the upper half of the cornea, the aqueous humour escapes from the chamber through a small opening in the centre of the incision. During the day atropine was used every two hours; at night the pressure bandage.

31st May.—To-day the eye-ball, being perfectly free from irritation, the aqueous humour clear, the atropine effect good, and, above all, the wound itself clean, no attempt was made to reopen the anterior chamber.

Ordered: atropine every hour.

3rd June.—Day by day the eye becomes less irritable, the atropine effect proves good, there is total freedom from pain, and the ulcer is healing well. Patient, by his own urgent request, is discharged.

8th June.—The patient again presents himself; the eye is quite quiet. In the cornea is a somewhat whitish but transparent mark, corresponding in size to that of the late ulcer, and in this the wound scar is distinctly visible. Small vascular ramifications proceed from the under margin of the cornea to this discoloration.

Ordered: Ung. rubr.

Case II.—30th May, 1870.—Friedrich Sch——, æt. 57 years, tailor, from Biebrich, states that during the last week he has very often felt a pricking sensation in the left eye. On May 28th he was attacked by very severe pain in the eye and orbital bones, attended with great photophobia and lacrymation. These symptoms still continue and increase. The examination disclosed a grey opaque spot, situate below the middle of the cornea, rather low down, and tending outwards; it was about 5 mm. in diameter, the outer margin somewhat thickened, and with a light grey infiltration, the aqueous humour clouded, iris discoloured, pupil contracted and sluggish, great conjunctival and subconjunctival injection, no hypopyon.

The patient declined immediate admission into the institution, but the same evening he returned, the ciliary neuralgia having become more violent. It was manifest that in the course of the afternoon the ulcer had increased outwardly; hypopyon of the anterior chamber was now perceptible.

Ordered: atropine, pressure bandage, morphia $\frac{1}{4}$ gr.

May 31st.—Slept badly during the night on account of violent ciliary neuralgia; surface of ulceration somewhat larger, hypopyon almost imperceptible. At noon the base of the ulcer was cut through, and immediately an opaque aqueous humour escaped, spurting forth in a jet. Wet compress, atropine every hour. The pains which in the morning were very violent, ceased almost totally within about twenty minutes after the operation. In the evening the chamber was again cleared of water, and the pressure bandage was then applied.

June 1st.—Slept well during the night, pain completely gone, the iris seems somewhat adherent to the corneal wound. In the

afternoon the ulcer displays a cleaner appearance, and the grey-yellow infiltration on the outer edge of the ulceration has vanished. The anterior chamber was opened with a silver hook, and then by a gentle friction of the upper lid along the cornea the connection between the iris and the wound was removed. Ordered: atropine and moist compress. In the evening the anterior chamber was again opened, and the pressure bandage again applied.

June 2nd.—In the morning the wound was reopened; during the day atropine every two hours. Towards evening a rather sudden attack of a violent ciliary neuralgia occurred, it, however, totally ceased within about ten minutes after a discharge of the aqueous humour.

June 3rd.—The anterior chamber again emptied; the ulcer now presents a perfectly clean appearance, and manifests a tendency to cicatrization; the symptoms of irritation have greatly abated, and a very favourable mydriasis has set in; all further opening of the anterior chamber was therefore abstained from, and the treatment was limited to atropine, and application of the pressure bandage.

The same treatment was repeated during the following days; during these the surface of ulceration had so far cicatrized that on the 8th only a slight opacity was visible in the cornea, the scar of the wound appearing in it like a grey streak.

Ordered: Ung. rubr.

13th.—The patient was discharged, with a corneal opacity, scarcely perceptible save when viewed by means of oblique illumination, of a size corresponding to that of the late ulceration, and through it extends a darker streak, the corneal cicatrice.

Case III.—Mr. K——— has been for four weeks suffering from disease of the eye. He has been under the care of another practitioner, and was treated by him with atropine, etc.

12th January, 1870.—There are two ulcers, each somewhat larger than a grain of millet, situate a little above and internal to the centre of the cornea. The upper ulcer is deeper and larger than the lower. There is intense ciliary injection, lacrymation, photophobia, and ciliary neuralgia.

Ordered: atropine at two hour intervals; three times daily warm fomentations, each of an hour's duration. In the evening morphia injection, and during the night the pressure bandage.

Under this treatment the ulcers had by the 15th of the month increased a little in size, and had also approached nearer to each other. The other symptoms continued unchanged.

On the 16th even the enlargement of the commissure, in order to lessen the pressure upon the ulcers was found not to have had the desired effect, and so on the 20th the two ulcers were found incorporated into one.

On the 21st the slitting of the base of the ulcer—the keratotomic operation—was performed; atropine was dropped in at hourly intervals, wet compresses, and during the night the pressure bandage were applied. After the operation the pain immediately and entirely ceased.

January 22nd.—Good sleep during the night; the corneal wound reopened.

23rd.—The base of the ulcer was cleaner.

January 26th.—Up to this date the wound was reopened daily, sometimes but once, some days twice, and at the same times aqueous humour was discharged from the chamber; atropine was dropped in at two hours' intervals, and at night the pressure bandage was applied.

On the 28th January the basis of the ulcer had become considerably clearer, and had begun to fill up.

On the 5th of February a good vascular ramification, from the corneal edge toward the ulcer, had manifested itself.

On the 13th the reparation of the ulcer was completed throughout, with the exception of one small spot, where the epithelium was still wanting.

On the 20th the patient was in condition to leave, with a clouding of the cornea corresponding in size to that of the basis of the ulcer; in the centre of this clouding was the scar-mark of the incision. He was accordingly discharged, being able to read No. 3 Jaeger.

ATROPHY OF THE OPTIC NERVE AFTER ERYSIPELAS OF THE FACE (TWO CASES.)

By Dr. Hermann Pagenstecher.

I have lately had, in the Ophthalmic Institution at Wiesbaden, an opportunity of observing two cases that claim attention as well by reason of their rarity, as of their rapid and deplorable results. In each case the disease under treatment was declared erysipelas of the face and head; in one case the result of a wound, in the other spontaneous. In the one complete atrophy ensued within the space of fourteen days; in the other incipient atrophy with very great diminution of acuteness of vision was the final result.

Ophthalmic literature, at least so far as my acquaintance with it extends, contains but few analagous reports. In the "Ophthalmoscopische Hand Atlas," of Edward von Jaeger, are reported, for the purpose of elucidating Plate X., fig. 51, and Plate XVI., fig. 75, two cases of disease in which the details bear much resemblance to those of the two cases under consideration. The description there given of the first case leaves no doubt of its being a case of erysipelas, and the symptoms mentioned in the second case scarcely admit of its being classed otherwise. In both cases the vessels extending downwards, exhibited a considerable decrease of volume; and a precisely similar characteristic, accidental possibly, was noticed in one of our cases.

It is not my intention to enter into a long discussion as to the essential origin of this atrophy. That the erysipelatous process has extended into the posterior tissue of the ball of the eye is very likely; whether it operates there simply by pressure, or as in the cases lately published by Busch upon peculiar tumours, by absorption, I shall not express an opinion.

Case I.—Johann F———, æt. 63 years, peasant-farmer, while working in a vineyard, early in the month of April of this year, received an apparently slight hurt on the inner angle of the left eye, from the stroke of a vine branch. The patient continued to see perfectly well with the eye, notwithstanding the hurt. He states expressly that he shut the right eye, and did not perceive any decrease in the power of the left eye, and he continued his work as usual until the evening of the following day. Then there suddenly set in feverish symptoms, accompanied by the formation of a red swelling at the seat of injury, and by pain of the eyelid. This soon spread over the left side of the face, and a portion of the upper part of the head; on the day following the eye was completely closed, so that it could not be seen. The patient further stated that he had slight pain in the ball of the eye, and some little difficulty of moving it. After the lapse of fourteen days, the swelling of the eyelid being over, the patient found that he could see nothing with that eye.

When the patient presented himself, on the 24th May, 1870, at the Ophthalmic Institution, a slight scar was perceptible on the inner angle of the eye, extending to the upper lid; there was also paresis of the levator palpebra superioris. The ball of this eye lay a little deeper in the orbit than that of the right eye; its size and consistency were perfectly normal; it was quite blind.

The ophthalmoscopic examination showed that the refracting media were clear, papilla white and sharp edged, atrophy of the retina-tissue to a very high degree; two thread-like vessels extended downwards, but were lost sight of at a little distance from the papilla; upwards three larger, one an artery, the two others veins, were traceable somewhat farther in the retinal tissue. No traces of preceding inflammatory action existed. The examination of the right eye gave emmetropia V = $\frac{1}{1}\frac{5}{5}$.

Case II.—Carl D———, æt. 49 years, brewer, was until lately in perfect health, and has enjoyed good sight, both for remote objects and for those near at hand. Latterly he has used spectacles when reading, but he does not know the power or number of the glasses.

Some short time before Easter, this year, he became ill during the night with feverish symptoms, and violent headache. On the following day the face began to swell, to redden, and to be

in pain. The eyes were, as the patient expressed himself, quite shut up with swelling, but not protruded nor painful; he only occasionally had a sort of itching in the eyes. The swelling soon spread over the whole upper part of the head. The malady lasted about three weeks, and the doctor, under whose care he was, called it erysipelas of the head and face. When the patient quitted his bed for the first time at the end of the three weeks, he observed that his sight was very much impaired. His sight has ever since continued in this same condition, at least he has never noticed any further diminution.

May 28th.—The examination of the eyes, made to-day, gave for both: Hm $= \frac{1}{30}$ V $= \frac{15}{100}$. With $+ \frac{1}{26}$ he with difficulty read No. 12 J., and with $+ \frac{1}{10}$, No. 6 J. The refracting media were perfectly clear, the papilla, of both eyes, of a reddish-white colour, and sharply edged; lamina cribrosa perfectly perceptible, vessels few in number, arteries particularly small; no noticeable alteration of the macula lutea, nor perceptible change in the periphery of the retina. There was no circular contraction of the field of sight, but there was a rather sharply bounded and clearly marked field of opacity around the central point of each eye.

A CASE OF AMAUROSIS AFTER ERYSIPELAS.

By Jonathan Hutchinson.

Whilst this number of the journal has been passing through the press, a case has come under my notice which is of much interest in connection with Dr. Pagenstecher's paper on amaurosis following erysipelas of the face.

Mr. Richard Allen is a philanthropist, well-known in Dublin. He went over to Metz to give aid to the war-victims, and whilst so engaged was attacked with erysipelas of the face. His nephew and niece who were with him suffered at the same time from small-pox, of which the niece died, but there is no reason to think that his own illness was complicated with variola. He was attended by Dr. Wyman, an able English physician, who considered the disease to be ordinary erysipelas. The eyelids of both eyes were very much swollen, so that for three or four days they could not be opened; but the erysipelas did not spread much on either scalp or face.

Mr. Allen, who is an elderly man, was slightly delirious for a day or two. He assures me that on the second day of the erysipelas he managed to open first one eye, and then the other, with the express object of ascertaining whether he could see, and that he found that he could see with both. After this the disease increased, and for several days the lids were closed. When next he was able to open them, he found the right eye quite blind. The attack does not appear to have been an unusually severe one, and there is no reason to think that the cellular tissue of the eyeball was specially involved.

Mr. Allen returned to London, and came under my observation exactly six weeks after his illness. He was then in good health, and enjoyed perfect vision with his left eye. His right eye diverged a little, and was totally blind. There was nothing whatever abnormal in its appearance, and he could move it well in all directions. Its pupil was small, and although it could be made to act moderately in sympathy with the other, it did not

move in the least when the other eye was kept shut. It dilated fairly with atropine. The media were quite clear. The optic disc showed no traces of inflammation, but was everywhere pale, and especially so on the side next the yellow spot, where the pallor amounted to whiteness.

The branches of the arteria centralis were very much diminished in size, whilst those of the vein were normal. The retina was not in the least clouded.

The facts of this case are remarkably similar to those of Case 1 in Dr. Pagenstecher's paper, the chief difference between the two being the less advanced stage of atrophy in mine. There had been no injury to the head, and it is difficult to offer any explanation of the connection beween the erysipelas and the blindness. I have seen several other cases in which an eye has been left blind after an attack of erysipelas of the face, but in most I think there was reason to believe that the erysipelas had been more severe, and had affected the cellular tissue of the orbit more definitely. We must not, however, forget the source of fallacy, that it is still just possible that the eyes in these cases may have been blind before the attack. I have mentioned the evidence which my patient gave on this point, and Dr. Pagenstecher states in his case a similar fact. In neither, however, can it be considered absolutely conclusive, and we must wait the record of other cases before we consider it definitely proved that erysipelas of the face can cause blindness. I may just add that the suspicion crossed my mind that Mr. Allen's case might be one of embolism, and that on examination of his heart I could discover no valvular disease.

MISCELLANEOUS CASES AND OBSERVATIONS.

By Jonathan Hutchinson, F.R.C.S.

(Continued from vol. vi, page 283.)

No. LIX.—*Albinism (incomplete). Divergence and Oscillation of Globes.*

Emma Pidduck, an infant, is a perfect albino, with the exception of eyebrows, eyelashes, and iris, in all of which a slight share of pigment is present. The irides are grey, but with patches of brown pigment in streaks in them. The fire red of the fundus is easily seen when the eyes are turned obliquely. The globes diverge and oscillate.

No. LX.—*Albinism in a Brother and Sister. Defective Vision and Oscillation of Globes in both. Hypermetropia.*

A gentleman from near Spalding, Lincolnshire, consulted me on account of imperfect sight, depending upon albinism. He was 24 years of age, but his perfectly white hair, eyebrows, and whiskers, taken with his florid cheeks, gave him the appearance of a very healthy old man. His albinism was perfect, there being no trace of colour in his hair, skin, or irides. The skin was simply very fair and florid, the entire absence of pigment leaving the capillaries more distinctly visible than in the normal state. He enjoyed good health. One of his sisters was, he said, in a similar condition, but with these exceptions, albinism had been never known before in his family. His sister, who is an albino, was a twin, and her twin-sister is not affected. His father is not very fair, but his mother is so, though still not to an extreme degree. All the children are fair, excepting the youngest, who is like their father, rather dark.

His albino-sister suffers as much inconvenience from her eyes as he does, and is obliged to stay almost wholly at home. His eyes twitch about very much; the movements being chiefly lateral. He has divergent strabismus, the right eye passing outwards. The degree of strabismus varies every moment.

He is not sensible of the twitching, and sees objects quite steadily. He seems to see equally well with either eye, and at 10′ reads 100 with + 4½; he sees 50 at the same distance. Without glasses he holds the page close, and at 2″ puzzles out No. 8; whilst with + 4½ he reads No. 8 at 5″, and can even read slowly No. 4. He has hitherto been using + 14, but with of course very little advantage.

No. LXI.—*Artificial Eyes worn by Young Children.*

A child æt. only 3 years, whose eye I removed on account of a wound, is now wearing a glass eye perfectly well. I have also under care in private another patient of about the same age, who also wears an artificial eye without any inconvenience. In a third case, still younger, no accident has happened. I feel convinced that artificial eyes might be given much earlier than is usually done with much advantage, especially where the cost is a matter of no importance to the parent. The effect of a conspicuous deformity upon a child's moral tone is often very injurious. A blind and blemished eye often subjects a child to great unhappiness, especially if he be of a timid and sensitive disposition.

No. LXII.—*Failure of Sight during Lactation, and its meaning as a symptom.*

When patients complain of defects of sight during suckling, it is very frequently merely an indication of hypermetropia. Many hypermetropic women experience no inconvenience whatever, excepting when weakened by lactation. Under such circumstances, they find it difficult to keep the ciliary muscle up to its unusual exertion. The difficulty of sight recurs over and over again during successive periods of lactation. These cases must be carefully distinguished from those of retinal disease, which are met with now and then after pregnancy. The use of tonics is indicated at the time, and it is well to examine as to whether spectacles are not requisite. In some cases this defect occurs in emmetropic eyes, and is induced by a form of paresis of the ciliary muscle analogous to what occurs in diphtheria.

No. LXIII.—*Loss of Accommodation from Nervous Shock.*

Temporary failure of sight when nervous, is very often an indication of hypermetropia. A patient may enjoy perfect sight under all other conditions, but be liable to lose distinct vision whenever startled. An example of this was supplied by a young woman who applied at the Ophthalmic Hospital a few weeks ago. She stated that she was very nervous, and that whenever anything occurred to startle her, she lost her sight for near objects. In particular, she mentioned that if in using the sewing-machine her needle snapped, she would be quite unable for a while to see her work. On examination, it was found that she was the subject of latent hypermetropia. An important distinction is to be drawn between a sudden failure of sight from this cause, and from "epilepsy of the retina," in that the former occasions dim vision only, not absolute blindness. As I have just remarked respecting the failure of accommodation, so common during lactation, that it may sometimes happen in emmetropic eyes, so I must admit that the temporary failures from "shock" do not necessarily imply hypermetropia.

No. LXIV.—*Pyramidal Cataract after Purulent Ophthalmia, but in one Eye only.*

William Henry Lincoln, æt. 10, is the subject of a pyramidal cataract in the right eye only. In the same eye there is a central opacity of the cornea. There was a single tag of adhesion between the iris and the cornea. In the left eye there was no cataract, and no corneal opacity. There was a history of severe purulent ophthalmia in infancy, affecting both eyes. Both eyes now oscillate and the right diverges.

I mention this fact as an addition to my report on this subject in Vol. VI, page 140. It is rare to find a pyramidal cataract in one eye only, and when such is the case, there is almost always evidence of corneal ulceration and of iritis.

No. LXV.—*Myosis and Irido-plegia from Brain Disease. Autopsy.*

Mrs. R., æt. 50, was admitted on the 20th February, 1868, on account of double vision. Both pupils were contracted and quite motionless. She could read No. 18 (J.). There was di-

vergent strabismus. No changes were discovered by the ophthalmoscope. During March she suffered very severe pain in the left side of the lower jaw, and towards the end of the month the skin supplied by the left mental nerve became quite numb. In the beginning of May she died, and the following particulars were kindly supplied by the surgeon who attended her.

Her alarming symptoms commenced only two hours before her death, and seemed to indicate chiefly failure of the circulation. She was not insensible, but her surface was cold and clammy.

At the *post mortem* the brain was found much softened on the surface of the middle lobe. The hemispheres themselves were firm in structure. The heart was not examined.

Although the *post mortem* notes are vague, yet the case is of some interest in reference to the fixity of the pupils and defect of vision without neuritis.

No. LXVI.—*On the occasionally intractable Character of Pustular Ophthalmia.*

A pustular ophthalmia is sometimes very intractable. The prognosis may be helped by observing the exact position of the pustules. Those which occur on the conjunctiva at a little distance from the corneal edge are, as a rule, easily cured by the use of mineral astringents, but those which occur on the cornea itself often degenerate into ulcers, and are exceedingly difficult to heal. Another rule of prognosis may be given, that whenever the pustules are found only at the sides of the cornea, that is on the parts exposed with the eyes open, they are more easily cured than when found on the upper or lower parts or when they make a complete circle. The following is a good case in illustration of the occasional severity of "pustular ophthalmia."

A boy, æt. 10, pale, but not specially unhealthy, was admitted on the 13th of January. His left eye only was affected, and a circle of phlyctenulæ, or minute pustules, completely surrounded the cornea, being placed on its outermost edge. The conjunctiva was much congested, but the middle of the cornea was perfectly clear, and there was not much intolerance of light.

The congestion of the conjunctiva was general, and its swelling was such as to occasion slight chemosis. The pupil acted well, and no pain was caused by sudden exposure. The ophthalmia was of one week's duration, but there was a history that in the previous year the same eye had been inflamed. The eye presented the conditions of phlyctenular ophthalmia in such a marked form, that it was thought worth while to have a sketch taken. It was expected at the time that the disease would soon be cured. Respecting the phlyctenulæ, it was noted that they occurred as minute round spots, grey on their surfaces, decidedly raised, but not containing any appreciable quantity of fluid. Not far from the centre of the cornea was a very minute opacity, which might easily have been overlooked, and which was possibly the result of a former attack. The boy was taken into the hospital, and nitrate of silver drops, two grains to the ounce, were used. No benefit, however, was obtained. The whole cornea subsequently became affected, and the other eye was also attacked by a similar disease. The case proved most intractable under all remedies, and the boy was under care for ten months, and recovered with extensive superficial opacities of the cornea. When he was at the worst, his face and scalp were covered with a pustular eruption, his eyelids much swollen, and he had intense intolerance of light. Neither counter-irritation nor topical applications did much for him. Amongst the latter calomel dusted into the eyes was employed without any good result. During his illness the boy became very pale and cachectic.

No. LXVII.—*Pyramidal Cataract in one Eye only, with Corneal Opacity.*

A boy, æt. 9. At the age of one week he had severe purulent ophthalmia, which was worse in the right eye than in the left.

When he came under me, he could see to read but only very slowly. He was hypermetropic; there was twitching of the globes.

On examination, a pyramidal cataract was found in the right eye, touching the cornea, and there was a limited central opacity. The rest of the lens was clear.

(See, also, No. 64, page 39, and my report in Vol. VI).

No. LXVIII.—*Mydriasis and Cataract in Infancy in connection with Syphilis. Subsequent Dislocation of the Lens into the Vitreous. Excision of the Globe.*

The following case is of interest as an example of destructive inflammation of one eye (choroiditis, &c.) from inherited syphilis. The patient, a healthy looking girl, æt. 12, came under treatment in June, 1869, on account of recent inflammation in the right cornea, and with the statement that her left eye had been blind from infancy. Her right cornea was in the early stage of syphilitic keratitis. Her left cornea was perfectly clear, and the pupil being widely dilated there was visible, deep in the pupil, a dense yellow mass. This mass at first sight looked like a new growth, but on more careful inspection, the outline of a displaced opaque lens embedded in lymph could be made out. The diagnosis as to syphilis, and the facts of the infantile history, were helped by some memoranda of Mr. Dixon's on her hospital paper. Under date Nov. 24, 1856, when the child was a few week's old, Mr. Dixon noted, "left pupil largely dilated and fixed, lens hazy, vessels of retina cannot be seen by the ophthalmoscope. Eye said to have looked quite healthy at time of birth." The child's mother added that the first change noticed was enlargement of the pupil, and that the whiteness of the cataract was not observed till a week or two later. In January the child had an eruption and snuffles, and Mr. Dixon prescribed grey powder, which was continued for some months. The child remained under care about a year, at the end of which time the lens was quite opaque, but still in place. The date of its dislocation was not known. After recovery from the infantile symptoms, the child regained good health, and the eye was quite quiet. As already stated, she now came under care on account of the other eye, in which insterstitial keratitis was beginning. As the lost eye had been somewhat irritable, and as it was absolutely blind, Mr. Hutchinson advised its removal. The lens was found imbedded in a dense fibrous structure in the outer part of the fundus, the retina and choroid being adherent and completely disorganised.

The attack of keratitis in the left eye ran the usual course of that disease, and was well in about six months.

No. LXIX.—*Acute abscess in the Lachrymal Gland. Good recovery after Incision.*

William Tait, æt. 8, on admission was found to have sore throat and swollen glands in the neck, and complained of pain in both ears. The symptoms had commenced on the Sunday, and on the Friday following the left eyelids swelled.

He was admitted February 16 with a large painful swelling in the region of the left lachrymal gland.

On the 19th the abscess was opened. It continued to discharge for about a fortnight and then healed.

No. LXX.—*Retinitis Pigmentosa.—Chronic Rheumatic Arthritis.*

Jane Grouse, æt. 45, applied November 5, 1868, being then all but blind from the effects of retinitis pigmentosa. Both eyes presented splendid examples of the advanced stage of this disease.

The symptoms had been gradually increasing from childhood.

There was no history of liability to eye disease in her family. She was very ill, and many of her joints were stiffened by chronic rheumatism. She attended only once, and is probably now dead.

No. LXXI.—*Case of Congential Cataracts, with Myopia and Deafness.*

William H., æt. 22, came under my care in 1865, with symmetrical congenital cataracts. His eyeballs were large and prominent, his cornea being remarkably wide. He was extremely deaf. The cataracts were not complete, but were sufficient to prevent his reading. He was known to have been short-sighted before they appeared. The lenses were removed by needle operations with success. He came up from the country again four years later (in 1869), and was then with + $3\frac{1}{2}$ able to read 1 J. easily. The case is of interest on account of the occurrence of cataract in connection with mal-formed globes and with deafness.

No. LXXII.—*Symmetrical Ptosis in a Child after Purulent Ophthalmia. Operation.*

A boy, æt. 5, was brought in April, 1868, with symmetrical

drooping of the upper eyelids. He could not lift either of them beyond a very little, and had a very narrow palpebral fissure. He was accustomed to hold his face constantly directed upwards in order to look forwards. There was no other defect of the ocular muscles, and his sight was perfect. The history given was that this condition followed a severe attack of purulent ophthalmia in infancy. His mother stated that he had been "blind" for a month after birth. I removed elliptical folds of skin from each upper eyelid, and with the result of obtaining very considerable advantage.

No. LXXIII.—*Case of Extreme Myopia.*

Mary Scott, single, æt. 40, applied at the Ophthalmic Hospital in June, 1868. She was aware that she had been short sighted from childhood, and that her defect had been gradually increasing. She had never used spectacles. With her right eye she read 1 J. easily at 3″, and with the left she could accomplish the same, though with some difficulty. She could not vary the distance of the page more than half an inch. With — 2 she read 70 at 20′. There were large crescents in both eyes, and in the right the choroid was absorbed near the yellow spot.

No. LXXIV.—*Neuro-retinitis in connection with Albuminuria and Disease of the Heart.*

I saw Mrs. A. in consultation with Mr. Chinery at Lymington, Hants. She was a lady of dark complexion, æt. 40, married. She had enjoyed good health until six months before I saw her, when she became the subject of sick headaches of extreme severity. From these, for several weeks she was scarcely ever free. She lost her flesh, and became pale, but no œdema of any part was observed. Two months before I saw her, she suddenly found that she could not thread her needle, and after this her sight rapidly failed, until she could only see large inch capitals. Both eyes were exactly alike. She had no pain in the eyeballs, no photopsiæ, no muscæ; simply a mist before them. At the time the eyes began to fail, she was quite free from sick headaches. At the time of my seeing her (Christmas, 1864) her pupils were of moderate size and active. Both optic discs were

covered with lymph, and there were also large white patches in the adjacent retina, with also some apoplexies. Her heart was hypertrophied, and there was valvular disease. I suggested that the urine should be examined, and Mr. Chinery afterwards reported to me that it was loaded with albumen. Mrs. A. died about a month after my visit, but no *post mortem* was obtained.

No. LXXV.—*Atrophy of Left Optic Disc, and Deafness on the same side, after a severe Blow on the Head, which was attended for a time with Hemiplegia.*

Jeremiah S., æt. 68, came under care at Moorfields on account of an acute ulcer on the right cornea. The interest of the case, however, was in connection with the other eye.

The *left* eye was nearly blind; with it he could not count fingers, could only just see one's hand. The pupil dilated well. There was slight opacity in the lens, but with this exception, the media were clear, and the fundus could be easily inspected. The disc was of blue whiteness and very conspicuous; it was somewhat depressed and shelving. The vena and arteria centralis were both considerably diminished in size, the latter being very small; they were both seen with beautiful distinctness.

The choroid around the margin of the disc was absorbed and presented a very definite rim, somewhat jagged and of unequal width at different parts. There was nothing abnormal in the retina or choroid at other parts. There was no albumen in his urine.

His statement was, that twelve or fourteen years ago, whilst in Australia, a tree had, one night, fallen on to his tent and struck his head. It was about ten days before he was able to go about again. His left ear became absolutely deaf from the time of the accident, and was in the same condition when he came under my observation. His left arm and leg were much weakened for a long time after the accident; they subsequently quite recovered, excepting that he was, when seen at the Ophthalmic Hospital, still subject to a little occasional spasm in the leg.

No. LXXVI.—*Hereditary Syphilis; severe Ulcerations since Childhood; Characteristic Teeth; Keratatis; rapid Improvement under Iodide of Potassium.*

Lizzie I., Irish, æt. 26, married four months and pregnant, well grown, applied at the Hospital for Diseases of the Skin on account of tubercular and ulcerating patches on her face. Then there were three patches, one on the forehead, and two on the chin.

On further examination, it was found that there were numerous large scars left by former ulcerations on both legs below the knees, both forearms, on the chest, and on the neck. On the right forearm just above the wrist, all the soft structures had been destroyed, and a thin scar adhered to the bones. The scars were very soft, supple, and pale, and the healed parts were perfectly sound. On the front of each tibia there was some ill-defined periosteal thickening. Her upper central incisor teeth were characteristically dwarfed and notched.

Both cornea were hazy from past keratitis. There was nothing very noticeable about her physiognomy. She suffered much from pain in the head, and there were several deep scars on the scalp. She had a troublesome cough, and had spat small quantities of blood.

This patient stated that the ulcerations began in childhood, and continued to recur in one or other place till she came to the hospital; she said that the face and neck had been attacked only about four years, and that about the same time her throat became bad and she began to be hoarse; when she was nine years old, she was blind for a year with keratitis. In childhood she was long under treatment in Dublin, and took chiefly tonics and cod-liver oil. In infancy she was very ill.

Her mother had about ten children, of whom five were living at the above date, the eldest being ten years older and the youngest three or four years younger than herself; none of them, so far as she knew, had suffered from the same disease; an elder sister who came with her seemed quite healthy. The patient took five grains of iodide of potassium with ammonia three times a day, using an ointment to the sores, and at the end of a month it was noted that "She has improved in colour and strength, and the sores have rapidly healed."

The question in this case was between lupus and syphilis. The aspect of the ulcers on the face was, to me, conclusive as to its being tertiary syphilis, and I fully expected a history of the *acquired* disease. The patches were large, dusky, scabbed, and cicatrized in parts; the thickening was much softer to the touch than that of lupus, and there was none of the semi-transparent deposit; the scars also were softer than those of lupus. The extensive destruction of soft parts on the forearm was also in favour of syphilis, and so was the periostitis of the tibiæ. The teeth and the keratitis were to me conclusive facts in favour of the disease being *hereditary*. If further evidence were necessary it was supplied by a reference to the age at which these symptoms began.

The case is interesting as an example of hereditary syphilis, remarkably like struma in some features, and like acquired syphilis in others. One of my main reasons for recording it here is, to ask attention to the value of interstitial keratitis when it occurs in connexion with other symptoms of constitutional syphilis, as proof that the syphilis is inherited and not acquired. I am not prepared to deny that there is any form of keratitis in connexion with acquired syphilis which resembles the interstitial so common in association with the inherited disease, but cases which could cause doubt to the experienced surgeon are undoubtedly most rare.

SINCE the last issue of our Journal, ophthalmic science has sustained its heaviest possible loss in the early death of its most zealous and successful cultivator. The discoverer of Iridectomy most certainly ranks as one of the foremost of those who, through surgical knowledge, have conferred benefits on mankind. Although, however, the cure of glaucoma stood foremost amongst the achievements of von Graefe, it was far from being his only one. There was scarcely a subject in the more recondite departments of ophthalmic science to the elucidation of which he had not helped. Nor do we by any means place his chief usefulness in his skill as an operator, or in the value of the contributions which he made to the literature of our speciality. He belonged to a nation amongst whom the vocation of the teacher is held in high honour, and to the end of his life he fulfilled the duties of this calling with the most zealous industry. Probably half of the more distinguished ophthalmic practitioners of the day have been educated to a greater or less extent by his oral teaching, and with many of these such was their reverence for his powers of investigation, that his opinions were received with implicit trust. It was enough that Graefe had said it. To himself, however, this was by no means the case; he was constantly re-examining his facts, and seeking to give new precision to his views.

We have the pleasure in this number of our Journal of presenting to our readers his last essay, in which, with singular appropriateness, he gives the world the benefit of his final conclusions on the subject with which his future fame will be chiefly associated.

No detailed biography of von Graefe has, we believe, yet appeared. Most of the journals have contained short obituary notices, and a good portrait given by one of our contemporaries, has been re-published in America.

We append to our brief expression of the deep sense of loss which every one who knew anything of Graefe's work must have felt on hearing of his death, translations of two of the notices of his career which have appeared on the Continent. One is from the pen of an intimate but non-professional friend; the other comes from his two editorial *confrères*, scarcely less distinguished than himself, Professors Arlt and Donders.

It is to be hoped that the sentiments expressed in the concluding paragraphs of the last named notice will find their echo in the hearts of us all. Graefe's illustrious co-editors find in his death a motive for increased zeal in their work, and they regard the maintenance of the repute of his Journal as a sacred debt to his memory. Let this sentiment be widely felt, and let us all try to appreciate the fact that in the death of a General additional responsibility has devolved upon all subordinates, and that we owe it to the memory of our noble brother to seek to work as he worked, with singleness of purpose, unflinching industry, and untiring faith.

The following pages from the pen of Herr Max Ring, an intimate friend of Graefe's, appeared in one of the Berlin newspapers soon after the event.

"IN MEMORIAM.—ALBERT VON GRAEFE.

"Amid all the noise and hurly-burly of the war, Berlin heard the melancholy tidings of the death of one who had rendered great and imperishable services to both science and humanity. Spite of all distinctions, the whole city, all Germany, indeed the whole world, felt the sad and irreparable loss which was sustained in the death of one who in his own domain was undoubtedly unrivalled, and who had not only gained, but maintained the highest rank,

as a benefactor of suffering humanity, as a highly gifted oculist, as a distinguished operator, as an author, and as a scientific teacher. A. von Graefe was born in Berlin in the year 1828. His father, the distinguished surgeon *Charles v. Graefe*, died whilst this, his youngest son, was yet a boy, leaving a considerable fortune to his family. Very loving care was bestowed upon Albert's education by his accomplished mother, *Augusta von Alten*, who also procured for him the best instruction which eminent masters could afford. The excellent *Dr. Gögel's* influence was paramount amongst all these, and he very early instilled and fostered a taste for mathematical science in his young and clever pupil, who at first aspired only to be a mathematician, but afterwards turned his attention to the natural sciences, bestowing special attention on physics and chemistry. The transition to the study of medicine was easy to one who had ever before his eyes the image of his distinguished father, and the memories of his early childhood, to allure him to such studies.

"As soon as Graefe had finished the prescribed curriculum at Berlin, he took his degree there, and after passing the State examination with the highest honours, commenced his scientific travels, whilst yet only twenty years of age, in company with some of his young friends and fellow students.

"He first went to *Prague*, where scientific medicine had as it were, just begun a new life, and where a band of distinguished men taught and laboured. His zeal and acquirements, as well as the name he bore, speedily gained him the esteem and friendship of Professors *Jaksch*, *Dietrich* and *Arlt*.

"Graefe cherished ever after a fond recollection of the old Bohemian capital, where, he was wont to say, he spent the time of his first love for medicine.

"From Prague he betook himself to *Vienna*, and afterwards to *Paris*, where he stayed the longest. There, indeed, he felt himself truly at home, and the most distinguished scientific men, such as *Desmares*, and *Sichel*, became his friends. After Graefe had gained the objects he sought from the great institutions of the French capital, he returned to his native city, after a brief residence in *London*, *Dublin*, and *Edinburgh*, in order to settle in Berlin as a surgeon and private tutor. But even whilst at Prague, he chiefly interested himself in ophthalmic surgery. His former friend, Professor *Arlt*, has the credit of inducing him so to do. Whilst in Vienna the celebrated Professor Jäger, furnished him with the most ample means of observation. Such a spirit as Graefe's is however not satisfied easily with the observations and discoveries made by others. He started a clinique of his own, and as human patients were not forthcoming, he availed himself of rabbits, in which he induced various forms of eye disease artificially. Each animal had his number inscribed on a leaden label, fastened to an ear-ring, and a corresponding number was

entered in his Clinical Journal (case-book), in which a daily record of symptoms was duly made, till the account of the *post mortem* formed a fitting finale to the diary of disease. Thus, aided by his friends, Graefe rehearsed the part he was afterwards to play, and practised on his rabbits those powers of observation which were to be utilized for the aid of suffering humanity at a later date!

"Thus equipped, and as it were already distinguished, he commenced practice in Berlin with surprising success. His name was soon known, and he shortly became the most frequented oculist in that city. The ample means he had at his command, enabled him to erect a clinical hospital of his own. Not only the poor, who were his first patients, but very wealthy, and even royal personages gave their confidence to this young and truly gifted surgeon. Not students only, but practitioners of long-standing attended his practice and teaching, to learn of him. Every day increased his repute. Eye-patients flocked to him from the provinces, from distant countries, and from beyond the sea, to get advice from this surgeon, famous in spite of his youth. The University and the Administration honoured him no less than themselves, by speedily electing him to the offices of Professor and Geheim Medicinal-Rath [Privy Councillor]; whilst foreign Princes distinguished him with various tokens of their regard.

"Although external circumstances doubtless contributed to this, only real talent and true genius could have achieved such success. However highly we may rate the means at his command for attaining success, his own services to humanity and science will always remain truly great. He gave such a new and undoubted impetus to ophthalmology in so brief a space of time, that the sum total of his own contributions seems almost incredibly great; we may affirm without any exaggeration, that *the recent extraordinary development of ophthalmology took its rise chiefly from Graefe's own person and labours.* He elevated ophthalmic medicine, which was previously regarded as a mere appendage to medicine and surgery, to the rank of an independent science. Not that he was lacking in either power of intellect or comprehensiveness, nor like many of his contemporaries, who, like Polypo, rooted themselves to one point in the study of animal cells, or were buried deep in the remarkable phenomena of chemistry and physics; but because the exhaustless wealth of his discoveries, and the rich fruits of his investigations and experiences could not develope themselves satisfactorily on any limited basis, nor be comprehended by a divided interest. Of all parts of the organism, the eye is known to be the most accessible to direct observation, and indeed lies open to it, resembling closely, in its construction, the philosophical apparatus known as the *camera obscura.* The invention of the ophthalmoscope has fur-

nished us with an instrument and means of recognizing and explaining morbid alterations of the internal tunics of the eye, and renders their diagnosis an almost absolute certainty.

"Although the honour of this happy discovery undoubtedly belongs to the celebrated physiologist, Professor Helmholtz, yet Graefe was the first to recognize its great *practical importance*, and to extend its application enormously. Armed with this discovery, he made ophthalmology assume an entirely new form, and take a new and definite significance. He discovered conditions heretofore unknown, and elucidated the true nature of those previously known, but not before explained. Thus he led the way to new and sure methods of cure, which in his own hands were sometimes startling in their success. Graefe's perfect mastery over all the sciences auxiliary to medicine (especially physics and mathematics) greatly contributed to this. He united a happy faculty of combination with an earnest and intelligent love of physiology, and practical cleverness with theoretic culture, and a rare faculty of observation. Thus he was able to elevate ophthalmology to that compactly knit science, intersected by fine mathematical lines, which is recognised as such by every accomplished surgeon of the present day. He was the father and founder of that branch of ophthalmic science which deals with the interior of the eye, and which found an appropriate organ in his "Archiv. für Ophthalmologie." Such was the spirit in which he worked and taught, and founded a school of his own, which has sent out the most distinguished oculists in the whole world.

"It would be a difficult and almost impossible task to make Graefe's scientific labours and contributions intelligible to the unprofessional reader, however accomplished he may be, since they principally concern physiology and the medical sciences. We must, therefore, limit ourselves to the most generally understood, and most interesting discoveries of this distinguished surgeon.

"Graefe was the first to recognize a frequent course of extreme degrees of myopia in an insidious form of inflammation of the interior of the eye (*sclerotico-choroiditis posterior*), with which there is often associated blindness from "black cataract," and retinal complications, and by timely application of copious abstraction of blood, combatted it with the happiest results.

"Far more weighty and important are his labours on the so-called "green cataract" (glaucoma), a malady of the eye which was previously deemed incurable, and usually ended in total blindness. With the help of the ophthalmoscope Graefe was able to recognize this common disease of the vitreous even in its very beginning, and to arrest it by an operation as simple as it was happy in its conception.

"Equally interesting are his researches as to those intestinal worms which he observed in the humours of the eye, and was

fortunate enough to remove, thus obviating the else inevitable blindness which threatened.

"The cure of (the less dangerous, but more common) "gray cataracts" also owed to him a simple and safe method of operation, now almost universally adopted by surgeons.

"Graefe also rendered very important services by his accurate investigations of the muscular apparatus of the eye, and their influence in various forms of disordered vision. His work on the "Physiology and Pathology of the Oblique Muscles of the Eye," and that on "Squint," may justly be termed classical, and mark an epoch in medicine. Moreover, Graefe possessed in a high degree a mastery over forms of expression, and a command of language, which give a special value, and a charm of their own to his scientific utterances.

"It appears almost inconceivable how he could have found time to do so much, and such imperishable work, when we remember that almost the whole day was taken up by practice, and that his constantly failing health compelled him to frequent idleness.

"He generally sat down to his "work-table" at 7 A.M., and devoted himself to scientific work exclusively till 9 A.M. Then he delivered his lectures, which were attended not by students merely, but by surgeons practising at home and abroad. Clinical teaching, and attention to his patients at the "Polyclinik," which was daily attended by from 100 to 150 eye-patients, occupied him till 3 P.M. Rapidly despatching some minor operations, he then entered his carriage to visit his patients in town. By 5 P.M. at the earliest he regained his home, exhausted, to get his dinner. Not unfrequently he lacked the needful time for this, and took a frugal dinner in his carriage. At 6 P.M. he saw private patients at his own house, and this lasted some hours, as there were generally 50 to 70 such. When they had all gone he returned to his forsaken scientific labours, which often occupied him till the early morning hours. Thus all his life, excepting some two or three hours a day, was given to work. Yet Graefe was by no means an ascetic pedant, or an enemy of social joys. As long as he was unmarried he associated with his young friends and assistants, who were mostly fellow-students. In the winter he often played Ombre; in summer he preferred to amuse himself with his gun in the country. He did not care for large parties, preferring a smaller circle of accomplished men and women, to whom he felt specially attached—a circle which included *Ernst Dohm*, the gifted editor of "Kladderadatsch" (the German "Punch"), and his interesting wife; the amiable Countess *Clotilda von Kalkreuth; Hiersemenzel*, the barrister; *Dr. Waldau* (Schuft), the oculist, and his wife; *Lind Fuhr*, the ex-court comedian; and the writer of these recollections, who met once a week regularly at Graefe's house. A cheerful unconventional tone predominated in these assemblies, and in such society Graefe developed his

innate worth and amiability, and his natural liveliness of disposition; whilst in his rôle as host he charmed all hearts. After his marriage with the *Countess Keuth* he lived almost exclusively in his family circle, happy in a charming domesticity.

"Graefe loved nature, and the country above everything, and in them he yearly recruited his enfeebled health, and gathered fresh powers for his overwhelming exertions. He spent most of his holidays in the Swiss Alps, and Savoy. Monte Rosa was a specially favourite spot of his. In his youth he was considered an intrepid mountaineer; but in later years, when chest-disease forced him to be more careful, he went every year to the watering place of *Heiden*, in Appenzell, where he felt himself most at home, and where indeed he was considered to be the principal visitor, and honoured as the *genius loci*. Even there many patients, often from great distances, followed him for advice and aid. Combined with his love of nature, Graefe exhibited the liveliest interest in art, especially in music; and spite of his numerous engagements very few important literary or artistic events escaped his notice. As a man, Graefe was distinguished by a fine sense of justice, and by his uprightness, both in his own conduct, and in his judgments of himself and others. He gladly recognized the labours of deserving foreigners, whilst he was modest in the extreme as regards his own discoveries.

"To his colleagues he appeared as amiable as he was manly, and only where he saw gross ignorance and unscientific arrogance united with obscurity of expression, did he display himself as a sharp and almost annihilating critic.

"Towards his clients he showed the greatest sympathy and patience. Rich and poor received the same attention. His consulting-room was always open to the needy, and his benevolence was not confined to the mere giving of professional advice. He devoted a great part of his large income to the welfare and improvement of his fellow-men. Many a man owes to Graefe not only the preservation of his sight, but even his daily bread! To his own friends he was the best of friends, in sorrow, as in joy—always interested in them, and their affairs. Amongst these he reckoned his assistants and fellow-students, with whom he always maintained the old footing of his college-days. He preserved pleasant memories of his first year at college with them, the relics of which, the polished rapier [duelling-sword], the flat student's cap, and the variegated sash of the student's "Union" were piously preserved by him.

"This attachment to old and beloved associations was a peculiar and amiable trait in Graefe's life and character. His old nurse, and the old coachman, *Paddenheim* (an heirloom of the family) always lived in his house.

"With a powerful intellect Graefe had also a depth of kindly nature in him, only fully known to his nearest companions and

friends. His outward appearance corresponded in no slight degree with his real nature. The tall, slender figure, somewhat bent forward, gave him an almost transcendental appearance, since the soul, as it were, conquered the body, and the weak body appeared only as the transparent veil of the immortal spirit. Noble and finely cut features, surrounded in his youth, with dark locks, which reached his shoulders, whilst an ample beard covered both chin and cheeks, made the most superficial observer aware that he was in presence of no common man, and of no ordinary nature.

"The serious expression of the high, clear, and reflective forehead, was softened by the friendly smiles of his fine lips, and the benevolent glance of his dark eyes. Of late years, disease and incessant labour had rapidly changed the dark hair to grey, and his interesting features showed lines which marked the presence of the fatal foe he bore in his bosom. Ere he had completed his 43rd year, Graefe's sufferings terminated. What he has achieved, and that which he has bequeathed us, is as great as his life was short. His fame is well ensured; his name will live for ever in the annals of science, but his best and fairest fame lives in the hearts of thousands, to whose darkening eyes he gave or preserved that priceless boon, the very source of light, the power to see.

"*Berlin, July* 23, 1870."

The following notice is extracted from the "Archiv. für Ophthalomologie," band xvi, abtheil 1, 1870 :—

"For the first time in a long series of years this volume of the Archives appears without any contribution from the pen of the gifted and distinguished man, who established them in conjunction with ourselves, and by whose name they were known all over the medical world. He had indeed selected, arranged, and prepared some manuscript for the press, but his rapidly failing strength forbade his enriching this number with any of his own work. In the evening hours of one of the few hot days of this cold and rainy summer, Graefe enjoyed the coolness and refreshment of the garden-saloon of his beautiful house. To ensure the same comfort for him all through the night, a bed was got ready for him in this situation. About midnight, as was his wont, he retired to rest; more comfortable, and perhaps freer from thoughts of death than he had been for a very long while. He was soon seized with excruciating pains, which, after considerable suffering, brought his richly-productive life to a sudden close.

"Von Graefe left us on the night of the 20th July, in the midst of the tumult and confusion caused by the outbreak of a fearful war. To say anything to the readers of this journal of

this man's position in science, or of the high-toned impulse which ophthalmic medicine and surgery derived from his guidance, or to mention the pre-eminent place he held as a teacher of studious youth would be quite superfluous, would, indeed, incur the charge of taking owls to Athens. Our readers surely need no words of ours to remind them what these Archives (to the joint-editorship of which our departed friend invited us in 1855, after one volume had been published under his sole superintendence) owe to him, for Graefe himself has furnished abundant proofs of this, which stand like milestones along the road of the last 15 years. But this we may say, that we hold it a sacred debt, due to the departed, to continue the editorship with like intentions and in the same spirit as he displayed, and to maintain for this journal the influential position it has hitherto held in ophthalmic literature. Whether we shall succeed in so doing depends greatly on the continuance to us of the loyal support of our fellow-labourers in the same vocation with which the Archives have so long been favoured. We know that in thus continuing the work, we are fulfilling the special wish of the dear departed, and we make the request for aid from German and foreign ophthalmic surgeons in his name.

"But looking back to the freshly-opened grave of our never-to-be-forgotten and never-to-be-replaced Albrecht von Graefe, our mournful cry must be—

"Amicissime Requiescas in Pace!"

"F. Arlt.
F. C. Donders."

PART II.

A Periscope

OF

CONTEMPORARY OPHTHALMIC LITERATURE.

A CONTRIBUTION TO THE PATHOLOGY OF THE VITREOUS HUMOUR.

By Dr. Hermann Pagenstecher, of Wiesbaden.

[Translated from No. 43 of the *Centralblatt f. d. Med. Wissensch*, 1869.]

I PROPOSE in this paper to give a brief account of the results of a long series of experiments made by me in the spring of the present year, whilst residing in Marburg. The purpose I had in view was to investigate with the ophthalmoscope the development of the changes induced in the vitreous of the rabbit's eye, by a variety of traumatic lesions; and at the same time to study the various stages of these processes by the aid of the microscope. I made it a special object to elucidate the question of the possibility of independent inflammations of the vitreous itself, by endeavouring to excite a strong inflammatory action in its very centre, by means which should cause as little disturbance as possible in the investing membrane. After many experiments, I came to the conclusion that the injection of irritants in a state of solution was undesirable, and the method I finally adopted was briefly as follows:—

A very fine, sharp canula (from Pravaz' syringe) was filled with an irritant in a solid form (particles of wire, wood, glass, and other substances were used), and introduced into the centre of the vitreous, the contents being pushed on with a fine wire. But in order to better investigate with the ophthalmoscope the phenomena induced in the vitreous by a strong irritant, as well as to facilitate microscopic investigations afterwards, with as little disturbance of parts as possible, I modified these experiments by using a small capillary (vaccine-lymph) tube filled with croton oil, having its outer extremity closed with wax. This was then introduced in the same manner as before, by means of the canula, into the very middle of the vitreous.

The appearances produced by these experiments lead to the following conclusions, which contrast strongly with the received opinions on the nature of the vitreous humour:—

1st. Neither the gelatinous substance of the vitreous, nor the stuctures contained in it, are capable of developing lymphoid corpuscles, as the result of the introduction of irritants which induce morphological changes, and inflammatory appearances in other tissues. From which it results,

2ndly. That these must find their way there from the contiguous organs.

3rdly. The vitreous appears to be quite indifferent to the action of very strong irritants, or, to speak more precisely, they do not produce in it any collection of lymphoid corpuscles, an appearance which is seen to be uniformly and rapidly produced by them in all organs susceptible of inflammation.

4thly. The vitreous cannot, therefore, be said to be susceptible of inflammation in the same sense as we speak of other organs. But every so-called inflammation of the vitreous ought to be considered as secondary to the alterations produced in other organs. Any irritant, therefore, in the vitreous will only induce inflammatory appearances as a consequence of active inflammation of surrounding vascular parts.

Simultaneously with these experiments, I had ample opportunities of investigating extravasations of blood in the vitreous humour, and the changes undergone by these; and, therefore, I was able to confirm the observation of Langhan, on blood-extravasations generally, namely, that the red blood-discs are taken up (introsumed) by the contractile spherical corpuscles (rundzellen), because I happened to see this process going on in a fresh preparation of the vitreous of a rabbit.*

Further corroboration of the above views, and the detailed description of the last experiments will shortly be published in a larger work.

CONTRIBUTIONS TO THE PATHOLOGY AND TREATMENT OF GLAUCOMA.

By the late Professor von Graefe.†

The Nature of Primary Inflammatory Glaucoma.—Of all the forms of glaucomatous disease, this is undoubtedly the one best

* I have not been able to refer to the observation quoted. In the "New Sydenham Society's Year Books for 1863–4, and in Mr. Simon's article on Inflammation, in Holme's System of Surgery, there are references to observations by Dr. W. Preyer (in Virchow's "Archives"), Hackel (Leipsic, 1862), and von Recklinghausen on the amæba-like movements of pus, connective tissue, and (white) blood cells, with allusions to their absorbing colouring matter, and coloured corpuscles of the blood, &c. In this way the "blood corpuscle-holding-cells" of some pathologists are supposed to be formed.

P.S.—The last edition of "Carpenter's Physiology" may give some further account.

† Translated and somewhat abridged by Thomas Windsor from the "Archiv. f. Ophth.," xv, 3, p. 108.

understood in respect to its pathology and treatment. The morbid phenomena certainly commence in the uveal tract; as the latter is the source of the intraocular fluids and regulates the tension of the eye, it is obvious that inflammatory irritation of it may lead to excessive secretion and increased tension. We are indeed obliged to admit certain predisposing or co-operative conditions in the nerves, vessels, or tissue itself, owing to which a serous choroiditis and irido-choroiditis assume the characters of acute glaucoma; for we meet with other inflammatory irritations of the same parts, accompanied by active or predominant absorption of the ocular fluids and normal or diminished intraocular tension. Yet as we have in other parts of the body numerous examples of the so-called secretory inflammations, in which the pressure in the tissue or the cavity is much augmented beyond its normal amount, we keep within the limits of current pathological thought, when we admit a definite form of irido-choroiditis, the very essence of which is to cause increased tension with its consequences.

Participation of the Retina.—The state of the *retina* and the manner in which blindness is produced in primary inflammatory glaucoma, may furnish subjects for discussion. Is the retina itself actively diseased? A question to which pathological anatomy will probably not furnish an answer; for the processes concerned are, it may be supposed, very transitory, and though we find the most various parts gradually implicated as the disease progresses, we must be extremely cautious in respect to any changes found in the retina at a late period. Besides as to the condition of the retina after typical glaucoma, there are as yet no anatomical alterations shown which have not resulted from an interruption in the fibres at the edge of the excavation, and which are therefore indisputably secondary. Our opinion must for the present be guided by the functional and ophthalmoscopic examination. It may well be maintained in cases of slight glaucomatous obscuration that the vision is impaired proportionally to the cloudiness of the media, so that there is no reason for supposing any impairment in the retinal conduction. We see patients in whom the aqueous is distinctly clouded, reading fine print, and must refer the impairment of vision to the optical interference, all the more because it is extremely probable that there are also similar diffuse opacities in the vitreous humour. In severe glaucomatous attacks the vision is often impaired to an extent that cannot be explained by even the most advanced opacities of the media. When the attack has been preceded by chronic glaucoma with excavation of the disc, we might imagine that the conduction of the retinal fibres which had been already seriously implicated, could be entirely arrested at the edge of the excavation by the suddenly-increased tension; when, however, the eye has been previously normal, or simply presented pre-

monitory symptoms, there can be no question about excavation, for the production of which a considerable time is necessary. The functional paralysis certainly justifies the suspicion of an accessory *retinal affection*.

This view is supported by the occurrence of *retinal ecchymoses* after iridectomy. Further experience has shown the essential correctness of my views.* The ecchymoses appear to be always present, when iridectomy is performed during an acute attack accompanied by great haziness of the media and great tension; they are then especially found near the disc and macula lutea, though they may extend over a large part of the fundus and even be accompanied by ruptures towards the inner surface of the retina. When the acute attack is attended by great cloudiness of the media, but with only moderately increased tension, the ecchymoses are common enough, though not quite the rule; they are usually more isolated about the posterior pole, forming only delicate rosy spots, whilst larger masses and ruptures towards the hyaloid are absent; they usually also disappear rapidly, so that their existence must be determined at all events within the first six or seven days. Retinal ecchymoses occur in a small proportion of cases, I might say exceptionally, when the media are but faintly clouded, whilst the pressure is much augmented. According to my experience they are not found at all in non-inflammatory glaucoma. In short, the inflammatory cloudiness of the media is the condition *sine quâ non* for their occurrence after iridectomy, whilst the degree of tension regulates the amount of the hemorrhage. I formerly considered them due to the sudden relaxation of pressure, yet when we consider how exceptional they are after operations in which the anterior chamber is opened, and that they are absent in non-inflammatory glaucoma, even when there has been most marked increase of tension, we must at all events allow the insufficiency of that explanation. Even supposing that diminished pressure is the direct cause of the ecchymoses, we have yet every reason for admitting a previous morbid state of the retinal tissue. Yet I do not think that we should imagine it to be morphologically a very marked one. The interrupted and therefore insufficient arterial current shown by spontaneous arterial pulsation which is rarely absent during a glaucomatous attack, the venous constriction, and finally the imbibition of the retina with pathological fluids thrown out by the uveal tract, may produce a state of fragility (softening?) of the retina. There is no such infiltration of the retina in the non-inflammatory form; whilst the circulation is usually less impeded, probably owing to the

* With the exception that I formerly believed (A. f. O., iii, 2, p. 502) that occasionally the ecchymoses pre-existed, only increasing after the operation. A case, in which there had been previously hemorrhagic retinitis, was probably the cause of the error.

more gradual increase of pressure. In an attack of inflammatory glaucoma—the slighter forms of obscuration, in which the ophthalmoscope can still be used with effect, prove this best—there is almost always spontaneous arterial pulsation, but in the non-inflammatory form it is only in exceptional cases spontaneous, the rule being that some pressure with the finger, less indeed than for the normal eye, is necessary for its production.

Nature of the Blindness.—Hence it appears that the *blindness* in acute inflammatory glaucoma is essentially a paralysis of the retina from ischæmia, the participation of the venous congestion, of the infiltration of the retina with pathological fluids in this paralysis or in the accompanying nutritive changes remaining uncertain.

It cannot be admitted that the increased pressure arrests the nervous conduction. The nerves will in general bear very considerable pressure, and specially in regard to the optic nerve this can be shown by numerous examples of disease, always supposing that the blood-vessels included in the nerve are not compressed at the same time. The terminal apparatus in the retina will probably suffer more from pressure than the fibres; yet, even as to the middle and outer retinal strata, much greater pressure would be necessary than that found in glaucoma. The intermediate agent is here, as generally in cases of "nervous paralysis from pressure," the arrest or *impeded flow of the arterial circulation.*

The *course* of primary inflammatory glaucoma and the effects of treatment are very regular, considering the enormous differences of degree and duration. The prognosis can be fixed with a satisfactory definiteness. Although it is certainly advisable to excise the iris freely and as peripherally as possible, yet the non-fulfilment of these conditions is by no means always, not indeed usually, followed by insuccess. I have seen a very great number of eyes in which the operation had been imperfectly performed for typical inflammatory glaucoma, and yet in which the cure had been permanent. The more the disease is attended by sudden cloudiness of the media, so much the more does the important point appear to be the excision of the sphincter pupillæ, whilst the really correct operation is the more indispensable, the less the media are hazy and the more the disease is simply characterised by increased tension. I would fain hope that these remarks will not induce carelessness in excising the iris; I consider that the best guarantee is given in all cases when the operation is performed according to the well known rules; yet for the explanation of the effect (in comparison with simple paracentesis) it must be of consequence, that the result may be permanent, though the periphery is not removed. This fact may also restrain the surgeon from too soon performing a second operation, upon the supposition that the first cannot possibly suffice.

The tension is usually *well reduced* immediately after the operation, even when it had been immense during the inflammatory attack, *i.e.*, it only moderately exceeds that of a punctured

eye. For a few days it increases somewhat, though usually not to any great amount, but it again diminishes spontaneously, either disappearing entirely, or leaving what is compatible with vision. The anterior chamber is permanently refilled, almost without exception in a few days, sometimes immediately after the operation. I note this circumstance here, because it is of importance with reference comparatively to many forms of non-inflammatory glaucoma.

Tendency of the Second Eye to Glaucoma is increased by Iridectomy.—That in inflammatory glaucoma the performance of iridectomy on the one eye promotes the outbreak of glaucomatous symptoms in the other (Vid. A. f. O., viii, 2, p. 255) has been confirmed by some observers, recently especially by Mooren (Ueber sympathische Gesichtsstörungen, p. 98), whilst others, for example, Arlt, look upon such a sequence as only accidental. Bowman also seemed to me in conversation not to be convinced that there was any real connexion.* My opinion is settled by what I have seen and noted in the last seven years, and I must now express myself more decidedly than formerly. I cannot admit that, from my manner of performing iridectomy, there is any reason why the second eye should be specially liable, in comparison with the practice of my colleagues. This could only be due to greater dragging of the periphery of the iris, and this I most carefully avoid; besides, in the cases in question, the course of the operated eye is perfectly normal, free from any increased sensibility of the ciliary region to the touch, &c.

I may take this opportunity of again pointing out the conditions under which the sequence is observed :—

1. The outbreak of glaucomatous symptoms in the one eye during the first two weeks after iridectomy on the other occurs only when the latter suffers from *primary inflammatory glaucoma* and is operated on during the period of irritation. I have not observed such a succession in cases of non-inflammatory or secondary glaucoma.

2. The succession is especially frequent, excluding in my

* Laqueur (Ann. d'Oeul. 1869, Jan.-Fev., p. 58) doubts this effect of iridectomy, because he has observed the same succession, without the intervention of an operation, thrice in 21 cases of acute glaucoma. Every one with a large practice can no doubt adduce examples of rapid spontaneous succession, but the proportion to the total number of cases, 1 : 7, as given by Laqueur, is decidedly not the average one. In Berlin the percentage of acute glaucoma seems to be considerably greater than where Laqueur observed, about 30 cases being operated on each year. I have also made use of the statements of many blind people, in whom there could be no doubt as to the precedence of acute glaucoma, from the history and appearance of the eyes. Thus, I found more than 300 cases of acute glaucoma when, four years ago, I collected my notes together. Even if I include, as cases of rapid succession, the patients who were no longer certain whether the second eye became diseased after some months or after a few weeks, the proportion would not then amount to 1 in 12; it is probably from $\frac{1}{15}$th to $\frac{1}{18}$th.

opinion the supposition of an accidental coincidence, when, under the circumstances just mentioned, the second eye already presents *premonitory symptoms*. A decided glaucomatous attack occurred in the second eye within fourteen days after the operation in 25 per cent. of those so treated, during the last two years indeed in rather more than 30 per cent.

Besides these cases in which iridectomy was of course performed on the second eye at once, a smaller series was noted, where, under the same conditions, the premonitory symptoms became more frequent after the operation, but again recurred at longer intervals after the first week, so that the operation was not urgently demanded. I operated during last year on two cases, in which the premonitory symptoms had previously recurred at intervals of months, whilst after the operation they recurred every evening, from the 2nd to the 4th or 6th day respectively, and then again there were intervals of weeks or months.

3. I have tolerably often seen the second eye become diseased soon after the operation on the other, where there had been previously no premonitory symptoms in it. A succession is, however, far rarer than when there are already premonitory symptoms, although it occurred in my experience more often (in about 10 per cent. of cases operated) than it does spontaneously within so short a period (in at all events less than 8 per cent., probably in only 6 per cent.), yet the number of cases in comparison with the differences is not sufficiently large to be decisive. I therefore limit my assertion still to those cases in which there are already premonitory symptoms; the question of an influence of less amount* must be left for decision to future observations.

I do not imagine that suppression in the one eye promotes the outbreak in the other, but I think that the traumatic irritation of the iridectomy or of the healing process radiates to the second eye.† This view is favoured by the fact that the tendency of the second eye attains its maximum‡ during the first few days after the operation, as it seems from the 2nd to the 4th day,

* This influence seems to be shown by two recent cases, in which the second eye had remained absolutely free during a premonitory stage of three and ten years respectively; finally, when acute glaucoma supervened, and was treated by iridectomy, cloudiness of the aqueous with iridescent vision occurred in the other eye, respectively on the second, or second and third days after the operation, and then again did not recur (now respectively half and three-quarters of a year afterwards). I am far from maintaining that iridectomy specially promotes this succession in comparison with other operations. I have once observed exactly the same result after removal of a cystoid cicatrix, and am rather inclined to believe that other operations would have this effect to a yet greater degree in proportion to the transitory irritation of the ciliary region which attends them.

† In agreement with Mooren (l. c., p. 98).

‡ The second eye is usually attacked by glaucoma in this period, only in very rare cases in the second week.

and also that promonitory symptoms become more frequent, or first appear, within a few days after the iridectomy.

Secondary Glaucoma; its Nature.—The pathology of secondary is far more complicated than that of primary glaucoma; indeed, from the varying nature of the primary affection, from the differences in degree and kind of the secondary state, and from the diversified reaction of the latter on the former, we meet with an infinite series of combinations, often opposing many difficulties in the way of analysis. No general statement can be made in respect to the power of iridectomy in this form of glaucoma, as a few examples will show. Some forms may be stopped by operation even in their last stages; such are those due to circular posterior synechiæ and to collections of retro-iritic fluid. We cannot of course restore in this way the nerve-fibres destroyed by the excavation of the disc, but we stop the increase of tension and the progress of the disease. In other cases iridectomy fails, or acts with great uncertainty, in diminishing the tension, as in the form dependent on retinal hemorrhage. Then we find examples where the operation seems not to lose its effect in respect to the pressure, but yet in which the prognosis is unfavourable owing to the primary lesion, as in cases of corneal ectasy; sometimes, indeed, the operation is contra-indicated by a tendency to cyclitis, as in cornea globosa. Finally, there are cases in which the secondary irritation is too great to be permanently modified by anything that does not act directly on the cause itself; such we find, at all events, at intervals, when the lens is placed obliquely, or dislocated behind a prolapse of the iris.——As our experience enlarges, we become more and more conscious how numerous are the considerations bearing on our treatment.

Secondary glaucoma may proceed from almost any inflammatory affection of the eye. I think, however, that the diseases which during their typical course are wont to modify the ocular pressure within a bearable amount, present a greater tendency to secondary glaucoma than those that do not usually do so; for example, there is a greater tendency in diffuse keratitis than in cases of circumscribed corneal infiltration, in equatorial choroiditis with opacities of the vitreous than in choroiditis disseminata.

Affections of the Conjunctiva and Cornea.—Glaucoma is scarcely ever originated by diseases of the conjunctiva, unless the irritation has extended to the cornea, iris, or ciliary body. A frequent source is found, however, in diseases of the cornea.

I was formerly inclined to think that, besides the corneal lesion, other complications in the uveal tract were necessary for the production of glaucoma. Now, though this is decidedly the most usual process, purulent infiltrations, ruptures, &c., inducing increased pressure through the implication of the iris and ciliary

region, yet I am fully convinced, that irritation of the cornea (or of its nerves) alone, without any complication, may excite glaucomatous increase of pressure.

Limited Corneal Infiltration (genuine circumscribed Keratitis).—This process, according to my experience, has hardly any influence over the tension, as estimated by the touch, and this may explain why it is rarely, if at all, the cause of glaucoma. I have only seen once a succession, at all events in respect to time. I may briefly relate the case on account of its rarity.

A woman, fifty odd years old, who had suffered for many years from eruptions on the extremities and occasionally on her left cheek, applied at the Clinic in June, 1866, for an ophthalmia of about a week's duration. We found an old eczema behind her left ear, an eczematous patch as large as a four-groschen piece at the lower part of the left cheek, on both sides blepharadenitis, and, finally, the special cause of her application, a circumscribed infiltration of the left cornea. The latter presented typical characters: there was an opaque and somewhat swollen spot, measuring 1·5 mm. opposite the lower edge of the pupil; its centre was yellow and opaque, passed into a light grey towards the margin, and merged gradually into the adjacent healthy cornea; the centre also projected and presented a slight excoriation. The pupil was small; it dilated on the use of atropine completely, though, owing to the existing irritation, slowly; the vision was quite in proportion; the tension was not tested at first, as there seemed no reason for suspicion.

The disease was unusually obstinate, owing, as we supposed, to the eczematous tendency. This led to a more careful examination, and it was expressly determined in the fourth, and again in the sixth week, that there was no complication whatever with disease of the internal organs; the tension was perfectly normal, not only within the physiological limits, but it did not even approximate suspiciously to the normal maximum, or vary from that of the right eye. The ciliary neurosis continued moderate till the eighth week; it then for the first time considerably increased, the aqueous became slightly clouded, the anterior chamber somewhat flattened, and the tension greater than in the other eye. The pupil was of tolerable size, though atropine had not been applied for the last eight days (the patient had been away).* From this time, whilst the original infiltration of the cornea remained wonderfully stationary, there supervened a subacute, perfectly typical glaucoma; paracentesis twice repeated had no permanent effect, and in the twelfth week from the com-

* I mention this, because I agree with the opinion that mydriatics may excite an acute attack when there is a tendency to glaucoma. I have mentioned this before in the Archiv., and was so much the more pleased to find an independent communication by D. H. Derby, in the Transactions of the American Ophthalmological Society, 1869, p. 35.

mencement of the disease indistinctness of excentrical vision at the inner side necessitated iridectomy. It was followed by the desired reduction of tension and by a rapid cure of the so obstinate corneal infiltration.

As, however, this is the only case in which I have seen typical circumscribed keratitis followed by glaucoma, it may well be imagined that the succession was accidental or that both affections were due to the eczematous diathesis.

Diffuse keratitis influences the tension to a rather considerable degree in most cases. During the increment of the disease we sometimes find a decided increase, whilst at the acme and commencement of the decline there is a distinct diminution; the eye may indeed be so soft in severe cases as to excite the fear of phthisis bulbi. Fortunately the latter rarely ensues; the tension gradually returns as the disease retrogrades. There is good reason for believing that diffuse keratitis is complicated with cyclitis when the pressure is extremely diminished, especially in dyscratic children; this view is supported by the insidious formation of posterior synechiæ, by the disproportionate deterioration of vision, and deficiency or great impairment of portions* of the visual field.

The general prevalence of absorption over secretion in diffuse keratitis may explain the exceptional occurrence of secondary glaucoma. I have observed this event only in some elderly people, in whom, moreover, the disease is relatively rare. After a lapse of one to three months, when the greater part of the cornea had become opaque, though to a very unequal degree, the tension increased, some haziness (it was difficult to estimate its degree) of the aqueous supervened, and finally iridectomy had to be performed for these reasons, and owing to impairment of the vision. Two of these individuals—one was a Berlin medical man—were extremely gouty, a third suffered from chronic eczema and much from hæmorrhoids; in the fourth, and there ends my list,† no special cause could be found. In all these cases iridectomy acted satisfactorily on the tension, but in two the opacities of the cornea became sclerosed (nahmen einen sclerosirenden Character an), vision being considerably damaged; such a tendency had, however, shown itself before the operation. The

* A satisfactory explanation is still required for the indistinctness or defect which accompanies great diminution of the ocular tension. No conclusions can be drawn from ophthalmoscopic examination, owing to the diffuse opacity of the cornea. The optical change cannot explain the more complete defects at all events; the usual form of separation, or any decided organic change of the retina, is incompatible with the ulterior recovery, so that I am inclined to refer the state to limited circulatory changes in the retina, perhaps accompanied by œdema, which would be likely to attend extreme diminution of the ocular tension.

† An interesting case, doubtless, of this kind has been published by Coccius, A. f. O., ix, 1, 6.

disease was monolateral in three cases, in one it attacked the two eyes at an interval of six weeks.

Sclero-keratitis.—This leads me to that form of chronic keratitis which is generally accompanied by inflammatory ectasia of the anterior hemisphere (what is called sclerotico-choroiditis anterior), and in which the infiltrations become immediately sclerosed; the latter are grouped like clouds, or extend over a segment of the cornea. Glaucomatous tension follows this process only occasionally and scarcely ever except at a late period. According to my experience, iridectomy reduces satisfactorily the tension, but is prone to excite further sclerosis of the opacities. I therefore advise, unless there is some urgent indication, the previous performance of peritomy (with active scarification of the episcleral vessels); I have found very decided benefit from this means, especially in regard to the tendency to sclerosis; it seems also to have some temporary effect in reducing the tension. Where there is already much bulging of the pericorneal zone, there is some risk of plastic cyclitis being excited by iridectomy, yet the danger compared with the relief is not so great as to contra-indicate this treatment, whilst at the same time it must modify our prognosis. This form of glaucoma seems almost always to attack both eyes, yet not at exactly the same time, and it often does not attain the same degree in the eye last affected.

Keratitis pannosa is far more often the origin of glaucoma than is generally supposed. Glaucoma sometimes springs directly from the irritation of the cornea, which is usually becoming atrophied and projecting; sometimes serous iritis intervenes between the two affections. The iritis furnishes in my opinion not unfrequently the reason why pannus is so obstinate: it may be readily overlooked, the increased depth of the anterior chamber which is at least in part due to the augmented pressure in the anterior chamber (inflammatory hypersecretion of aqueous humour) being referred simply to the diminished resistance of the cornea, and the delicate diffuse cloudiness of the aqueous being unnoticed behind the coarser anomalies of the cornea. Unless the practitioner is attentive, he only notices how badly the eye bears the mildest topical applications, the considerable pericorneal injection, and that the latter increases after any irritation. Serous iritis probably is most often the intervening link between pannus and secondary glaucoma. In many cases, however, we meet with the latter unaccompanied by any iritic symptoms; we then usually find that it has been preceded by deep ulcerations or partial projections of the cornea, which we have no hesitation in considering its cause.

In this form of serous iritis, single or repeated paracentesis generally suffices; it thus becomes an important agent in rebellious pannus, whilst iridectomy is decidedly indicated as soon as

glaucoma appears. It cannot be denied, that the operation is frequently followed by a temporary increase of vascularity in the cornea; it however soon retrogrades, and we find a very beneficial influence over the original disease exerted by the diminution of the pressure. Spontaneous improvement now ensues, or the eye will bear topical means, just as after paracentesis of the anterior chamber in simple serous iritis. As a general rule, we may repose greater confidence in the operation when the glaucoma is due to the intervention of iritis than when it is due directly to the changes in the cornea. There is indeed some danger of cyclitis when the membrane is very prominent in a case of pannus, a danger influencing our prognosis, but not contra-indicating the operation (as a last resource). We should make it a rule to carefully watch the intra-ocular pressure in all cases of inveterate pannus, and to proceed to the operation as soon as it becomes permanently increased. I learn from Dr. Tachau, now largely occupied with this affection in Egypt, that it is there more frequently followed by glaucoma and at a still earlier period than with us.

Like the primary disease itself, secondary glaucoma is frequently observed in both eyes, yet often enough we find it only in the eye first affected.

Corneal Cicatrices.—It is well known that glaucoma arises from cicatrices of the cornea, the result of deep ulcerations of very various nature. The fact that ultimate blindness often occurs after prominent corneal cicatrices, was noticed, specially by Arlt, at a time when the causal connection, the reaction of the ocular pressure on the optic nerve, was entirely unknown. Doubtless glaucoma occurs infinitely more often where there is synechia anterior after perforation of an ulcer, than where the latter has not perforated at all, or where the iris has again receded from the wound. Yet it is an error to suppose that such adhesion is a conditio sine quâ non. I have seen by no means unfrequently cicatrices after central ulcers from blennorrhoic, diphtheritic, or pustular ophthalmia, where there had been no perforation, followed by expansion of the chamber and ultimately by glaucomatous tension. At the same time I must admit that in all cases the ulcer had been deep and extensive, and that usually cicatrization had been irregular with recurrent irritation (so that we can admit the occurrence of specially active irritation of the corneal nerves by pressure, traction, &c., during the formation of the cicatrix); inclusion of the iris much intensifies the danger. For this reason it is of great importance to prevent synechia anterior in perforating ulcers and wounds, just as it is to avoid synechia posterior in iritis. As to both forms, glaucomatous tension follows in only the minority, fortunately for the patients, yet both are attended by permanent risk in every case. We have noticed not unfrequently, that eyes affected with synechia

anterior or leucoma adherens, after being good for many, many years, are ultimately attacked by glaucoma on the approach of old age.——The forms now under consideration affect one or both eyes, just as the primary disease.

It is commonly asserted that the cicatrices, that predispose to glaucoma, are prominent. It is quite true that leucoma prominens adhærens or staphyloma partiale threatens glaucoma far more than an equally large, but not prominent, cicatrix; yet it is not the projection, the special absence of resistance of the newly formed tissue, that is the cause. The loss of resistance explains why the tissue yields at the seat of perforation even to normal pressure when the process is recent, as for example in a partially cicatrised prolapse of the iris. On the other hand, the resistance becomes adequate in older cases; we find the cicatrix receding gradually to its proper level, unless it is opposed by abnormal intra-ocular pressure. Continuance of the prominence shows therefore that there is too great pressure on its posterior surface, at all events for a considerable period, till the new tissue has acquired a definite form due to its own structure.——With normal anatomical conditions, there cannot be a great increase of pressure in the anterior division of the eye, in the anterior chamber and the retro-iritic space, without an increase in the vitreous body, though to a little less degree. In cases of disease, where a partition is formed, by closure of the pupil, solid retro-iritic exudations, &c., between the anterior and posterior divisions of the eye, there may undoubtedly be very considerable increase of pressure behind a cicatrix without any notable increase in the vitreous space. Such is the state, as shown by palpation and the curvature of the sclera, in a great number of staphylomata and projecting cicatrices. The secretory irritation in the cavity of the staphyloma or in the anterior chamber is often transmitted backwards, exciting glaucomatous symptoms. The projection of a cicatrix is, indeed, accompanied by conditions closely allied to those obtaining in secondary glaucoma. We by no means deny that expansion of the cicatrix and of the adjacent parts may exert an injurious reaction, and thus be concerned in the production of the succession in question.

The conditions, with which we are here concerned, are very complex. The irritation in the fundus of the ulcer and in the cicatricial substance must be the source of the subsequent increase of tension, when there is no adhesion of the iris. When there is a perforation, the incarceration of the iris, the dragging of the same part and of the ciliary organs, may occasion the increase of pressure; yet in most cases, especially when there is a large perforation, the lens is the most important agent. Destruction of the zonula and consequent obliquity of the lens, pressure by it against the already irritated iris, prolapse of the whole crystalline system into the cavity of the staphyloma, or

even rupture of the capsule with swelling of the lens-substance, then originate the secretory irritation. The latter may, as the history of staphyloma teaches, be limited for an indefinite period to the anterior portion of the eye; it may, however, at any time excite secondary glaucoma.

The greatest attention must be paid to all the objective symptoms, for these processes usually occur during childhood, when no great reliance can be placed on functional examination, and the effect of the treatment depends on the stage of the disease. It is indeed mournful how many eyes, after escaping entire destruction from ulceration, as in ophthalmia neonatorum, are afterwards rendered blind by secondary glaucoma, for which active treatment has not been used in time. Every eye that presents a corneal cicatrix, and especially an adherent one, should be carefully watched, and no love of general principles should induce the surgeon to postpone the operation to a later period of life. It happens sometimes that the parents continue hopeful, and again apply at the time directed, but then it is found that the operation is inadmissible. No doubt it seems desirable for many reasons to postpone iridectomy in a child. Yet there is one urgent indication, never to be overlooked, owing to which the operation must be performed at any age; that is, an increase of the intra-ocular tension. Its first symptom in children with leucoma is usually an *expansion of the anterior chamber*. In them the resistance of the tissues is very different from what it becomes at a later period, when the optic disc usually yields (becomes excavated); the cornea and pericorneal zone give way in early childhood; excavation of the disc does not occur till a relatively late period. The augmented corneal diameter, the ectasy and the bluish semi-transparency of the pericorneal zone, the atrophy from expansion (discoloration and radial fissuring of the iris) are extremely important signs: the practitioner must never await their full development, for by such delay the time for operation may be lost. Of course there is the objection that the prominence of the cicatrix and the ectasy of the anterior hemisphere only show an increase of tension in the latter, that the excavation of the disc may not occur, and hence that delay may be advantageous. Still, even supposing that we are certain that the increase of pressure is limited, its effects on the anterior portion of the eye will not allow expectant treatment. We may lay it down as a general rule, that the dangers of iridectomy, especially the tendency to cyclitis, increase in proportion to the corneal ectasy. The increased diameter of the cornea is attended by no corresponding enlargement of the crystalline system, thus the zonula is stretched and becomes defective, the position and probably the circulation of the ciliary organs is rendered abnormal; it is a matter of experience that under these circumstances the most accurately performed iridectomy may be fol-

lowed by escape of vitreous, and as a consequence or not of the latter, by cyclitis; the latter is not always immediate, but occurs even after weeks or months. These dangers are trifling when the cornea is but little enlarged, but they increase very rapidly with the projection, cause enough for carefully tracing the commencement, and not postponing the treatment. For example, to delay in leucoma adhærens after ophthalmia neonatorum till the increased tension can be estimated by the touch, would usually be to wait till too late. *Every permanently projecting cicatrix should incline us to operate. Enlargement of the corneal diameter and of the anterior chamber are most decided indications.*

According to circumstances, paracentesis of the anterior chamber, iridectomy, excision of the cicatrix, and removal of the lens, may be required. The puncture has a permanent effect, only when the excessive secretion is due to transitory causes, for example in partial staphyloma irritated by external agents or before cicatrization is complete. Frequent and rapid repetition of the puncture can scarcely be recommended, owing to the tendency to suppuration in the cicatrix. Excision, without removal of the lens, is adapted principally for small prominent cicatrices of unhealthy structure, to the irritation of which we can refer the local tension, for ceratocele, for cystoid cicatrices over little prolapses of the iris, &c. Iridectomy may give brilliant results at almost any stage, from simple projection of the cicatrix to fully developed secondary glaucoma, but we cannot foretell its effects with certainty. It may effectually relieve the tension and cause the projection to recede to the normal level in cases of very large staphyloma, whilst it sometimes fails to give relief in apparently far more favourable examples. The reason is that the operation does not act directly on the special causes, the irritation of the cicatrix or the position of the lens, but only indirectly on conditions of varying importance. It diminishes the secretory irritability of the iris, and thus often enables it to resist the existing injurious agents. The morbid influence is too great at other times, especially when the oblique position or protrusion of the lens keeps up the irritation of the cicatrix. Then the lens should be removed (through a transverse incision or a partial excision of the cicatrix), at all events as soon as it appears that iridectomy does not give permanent relief.

We must not forget that the operation is attended with some risk; besides the danger of loss of vitreous and consecutive cyclitis already mentioned, it promotes the tendency to purulent softening, already present in many forms of prominent leucoma.* Purulent panophthalmitis may be the ultimate result, notwith-

* This is a reason for postponing iridectomy, in many cases, till the original process has completely ended. Such delay should be, indeed, the rule in central phagedenic suppuration.

standing the greatest attention paid to the after-treatment. In conclusion, we may say that iridectomy is of the utmost value in these conjunctures, and is less dangerous than excision of the cicatrix or extraction of the lens, yet it by no means overrules the whole course, and is not so free from risk as in simple inflammatory glaucoma.

Cornea globosa.—The operation is of far less value in the forms that are originated during fœtal life. They become further developed after birth, and, even at an early period, are often followed by glaucoma: they pass under the names of cornea globosa, staphyloma sphericum pellucidum congenitum, hydrops cameræ anterioris congenitus, hydrophthalmus congenitus. It is possible that these affections, even when they seem uncomplicated, are really due to an abnormal state of the internal membranes (latent choroiditis), which becomes evident only at a later period by opacities of the media, irregular pigmentation, &c. As, however, the cornea or its nerves may undoubtedly originate secretory irritation, we must admit the possibility that for a time the corneal expansion may be the only change. (Vide the Berliner medicinische Wochenschrift, 1868, No. 24, Ueber Keratoconus). Both eyes are usually affected, though one sometimes escapes for a long time or even altogether the secondary disease; it is, besides, by no means very uncommon for the primary disease to occur only on one side.

It is generally recognised that these are not promising cases for operative treatment. As long as there is simply enlargement of the corneal diameter and of the anterior chamber, before the occurrence of opacities of the media or excavation of of the disc, the sight is often relatively good, so as to contra-indicate any treatment attended with risk; consecutive changes may never occur, at all events the time of their advent cannot be predicted. Once present, they often progress so slowly, and iridectomy is attended with so much danger, that we hesitate to operate. We have already mentioned how intolerant of such treatment are large corneal ectasies; this is still more true of cornea globosa and allied conditions. Owing to the constant presence of defects in the zonula and the predisposition of the vitreous to infiltrations, iridectomy is always liable to excite dangerous, even purulent, processes in the vitreous, or, as in the other varieties of corneal ectasy, an insidious form of cyclitis; finally, when there is decided glaucomatous tension, there may be choroidal hemorrhage. Hence, iridectomy is only dubiously indicated where the disease is making rapid progress through the increase of pressure, and both patient and physician are inclined to try a remedium anceps. Nothing will be attempted in the vast majority of cases; where gradual deterioration is due to the ectasy, paracentesis may be used occasionally to check it,

a proceeding from which I have only exceptionally found benefit, but which is less dangerous than iridectomy, though not absolutely innocuous.

Riband-shaped Opacities of the Cornea.—I shall finally mention a form of glaucoma which must be known to many practitioners, though it has not been satisfactorily described, and which is doubly interesting, by its mode of development and the possibility of accurately tracing its origin. For a long time I was doubtful whether it sprang from the cornea or from the iris and ciliary organs. Everyone must have seen whitish-grey dotted opacities, running directly across the cornea (corresponding to a partial opening of the eyelids); they are riband-shaped, 1‴—1½‴ broad, peculiarly dull, and accompanied by chronic iritis, closure of the pupil, calcification of the lens, atrophy of the globe, or glaucomatous hardness. It is certain that such opacities occur also in old irido-cyclitis, but we are not here concerned with those so derived; exactly the inverse course takes place in a smaller proportion of cases.

For a certain time there is a simple *corneal affection*, without any complication; not till months, more often years, does the globe become hard, a hardness usually accompanied by posterior synechia, a steady deterioration of vision, and other symptoms, just like those in glaucoma. Ultimately the lens becomes opaque and calcified; the tension continues great; sometimes acute irritations are followed by phthisis bulbi, the result being thus exactly the same as after the inverse course from irido-choroiditis.

The patient does not generally notice the very commencement of the disease, nor does he consult a medical man till there is a little dazzling or impairment of vision. There is then found some photophobia, and a peculiar dulness of both the inner and outer side of the cornea; the opacity extends from the periphery towards, though it does not reach, the centre;* were the upper and lower edges prolonged forwards, they would include a transverse, riband-shaped space. Its colour is usually grey, with a shade of yellow or brown; it is most intense towards the margin of the cornea, somewhat less towards the upper and lower edges of the opacity, least towards the centre of the cornea where it gradually fades away; it is peculiarly dull, and hides, to an unusual degree, the iris. The epithelial surface is for the most part smooth; the magnifying glass shows that the opacity is composed of innumerable delicate greyish points. During this first

* The opacity is sometimes very great on one side at a period when it is scarcely noticeable on the other. Its upper and lower edges are occasionally not quite parallel, but converge slightly towards the centre of the cornea, yet even then the edges of the opposite opacity tolerably correspond, so that ultimately the transverse band formed by the complete opacity would converge a little towards the nose or temple.

stage the progress is extremely slow, many months being required to cause any perceptible difference; the disease may occasionally be quite stationary. And yet the two opacities very gradually approach one another, so that the resemblance to the form of a ribbon steadily increases. The most striking peculiarity besides the form is the extreme loss of transparency; the colour is a dirty greyish-white, or inclining to a yellowish-brown; the surface remains generally smooth. The whole appearance excites the suspicion of an inorganic deposit; I have, in former days, many times erroneously imagined that an ointment containing some metallic salt had been used. The disease appears to always affect both eyes, though in an unequal degree, and not at the same time.

Now, it is quite certain that before or at this time, the disease is totally *free from any complication.* The pupil reacts perfectly to light, and can be readily dilated by atropine. The vision is exactly proportional to the optical condition; it is improved by proper shading, the stenopaic slit, or by atropine and stenopaic convex glasses, to a greater degree than in older infiltrations of equal extent, owing to the exact circumscription of the opacity and the absence of irregular astigmatism from any abnormal curvature. The ophthalmoscope shows that the media, internal membranes, and optic disc, are perfectly normal. The most careful palpation can discover no trace of increase or suspicious variation of the tension. In addition to the opacity, there is only a greater tendency to pericorneal injection and to lachrymation when the eyes are exposed to the light, states clearly due to the corneal irritation and the dazzling from the diffusion of light by the opacity. To repeat, there is in this stage *disease of the cornea* alone.

After a time there are certain changes; occasionally the tension increases, the pupil becomes sluggish and somewhat dilated, and the disc excavated, as in glaucoma simplex; more often the iris becomes discoloured, no dilatation can be produced by atropine, the aqueous is periodically clouded, posterior adhesions are formed in a most insidious manner, though with some increase of the vascular irritability of the affected eye; very soon they not only correspond to the sphincter, but to the whole of the posterior surface of the iris. In company with this chronic iritis, the tension increases, and all the symptoms of secondary glaucoma make their appearance. Sometimes the anterior chamber is shallower, sometimes it keeps its normal depth, probably owing to the increase of pressure being equal to that in the vitreous space. Whether the iritis intervenes pathogenetically between the corneal disease and the glaucoma, or whether both are due directly to the corneal affection, cannot be decided. The second alternative cannot, of course, be rejected, because, as already mentioned, glaucoma arises in certain cases without the intervention of iritis.

The only change in the cornea during this later period is caused by the appearance of many intensely white, perfectly opaque spots. They somewhat resemble lead deposits, still more the calcifications in irido-cyclitis, with which their structure appears to be identical, so far as there has been an opportunity for microscopical examination. Any further changes in the eye are simply those of secondary glaucoma, and require no detailed description.

I have found very great and permanent benefit from iridectomy; but it must not be delayed too long, because the formation of synechiæ, soon extending along the posterior surface of the iris, will endanger the result. Wherever a large piece of iris, reaching to the periphery, could be excised, the result was very satisfactory in respect to the tension and the whole further course.

I am inclined to believe that the operation exercises some influence in preventing the spread of the corneal disease, though my cases are not sufficiently numerous to demonstrate it. The opacity always remains limited, and does not destroy vision, when the secondary changes are prevented. I have not seen any damage from the operation in eleven eyes on which I have performed it, neither increased sclerosis nor disintegration of the opacity, nor cyclitis, as after many of the complications previously mentioned. I employed the peripheral linear incision, when there were already extensive posterior synechiæ, as indeed I always do under such conditions. The objections which I formerly raised (A. f. O., xiv, 3, p. 147) to its general use in glaucoma, are not valid here, for the tension increases very slowly, and the anterior chamber never becomes extremely shallow. I have been obliged in a single case to make a second pupil diametrically opposite, in order to reduce the tension sufficiently; there were already very extensive pigmented neoplasms on the posterior surface of the iris.

The Iris.—Some brief remarks will be sufficient, as the importance of the iris is generally recognised in respect to the origination of glaucoma.

Purulent iritis, running its usual course, sometimes does not modify the tension at all, sometimes excites a very transitory increase followed by decided diminution, even by permanent atrophy of the globe; its influence, indeed, depends on its degree. Hence it plays scarcely any part in the production of glaucoma, though its residua, the posterior adhesions and collections of retro-iritic fluid, may give the impetus in question.

The *common plastic iritis* usually modifies the tension but little, the increment of the disease being attended by a very transitory and slight increase. Hence glaucoma rarely accompanies the primary attack; it occurs at a later period, when adhesions, projection of the iris by fluids, &c., have been left.

There are, however, exceptional cases. The pupil contracts and generally presents an obstinate resistance to mydriatics from the beginning; there is great pericorneal injection, in which, besides the anterior conjunctival vessels, the venous trunks of the episcleral network take an active part. The aqueous is not much clouded, and the cornea little affected in comparison with typical glaucoma. Yet the anterior chamber contracts, the globe hardens, and the vision sinks excessively; untreated, the optic disc becomes excavated.

I have scarcely ever observed this form, except in the second eye, after the other had been long glaucomatous; I cannot say, owing to the rarity of the cases, whether this is simply due to accident. Sometimes there was already an excavation of the disc (glaucoma simplex), and the iritis indicated, as it were, the transition to the inflammatory form. In other cases the eye had been previously perfectly healthy. In short, the only differences in the symptoms from those of typical inflammatory glaucoma, are the contraction of the pupil and the slighter haziness of the aqueous humour. Plastic iritis takes, so to say, the place of the usual serous form; with the latter the pupil is free, and there is no obstacle to mydriasis from compression of the ciliary nerves; the condition of the aqueous varies in a similar way, according to the form of iritis. The treatment is that of typical inflammatory glaucoma, iridectomy at the earliest period with the precautions necessitated by adhesion of the pupillary margin.

Serous iritis is of all inflammations of the iris the one most connected with glaucoma. This inflammation is characterised by diffuse cloudiness of the aqueous and of the posterior surface of the cornea, by increased tension in the anterior chamber, with little or no plastic exudation, and with no notable parenchymatous change. It shows, *per se*, a tendency to increase the pressure in the vitreous space. A part, but never more than a part, of the pressure may be removed by the recession of the iris and lens, the anterior chamber often becoming very much deeper. If there is no change in the position of the iris, it must be admitted—and it may be proved by palpation—that the tension is increased proportionally in the vitreous space. We must admit that there is always some slight increase of the ocular tension; that this is followed by glaucomatous symptoms in only a certain proportion of cases, notwithstanding the long persistence of the disease at its acme, is due to the age of the patients, for we know how relatively slight the tendency to excavation is in youth.

When, however, the tendency persists or is unusually great owing to continuance of the irritation, as when it is caused by rupture of the capsule or by dislocation of the lens, serous iritis ends in glaucoma at any age, even in early childhood. The older the patient, the greater is the risk of this termination; glaucoma should be suspected whenever with symptoms of irritation the

aqueous becomes clouded and the pupil becomes sluggish in elderly people. If, in addition, the anterior chamber is flattened and the pupil dilated and fixed, the diagnosis may be made without palpation; for as inflammatory cloudiness of the aqueous is attended by increased tension in the anterior chamber, the iris must be pressed back and the chamber be deepened, providing the tension is normal in the vitreous space. If, on the contrary, the iris is pushed forwards, the tension behind it must be very decidedly increased. The pupil may be sluggish and slightly dilated in simple serous iritis, yet, as the peripheral portions of the ciliary nerves in the iris itself are alone compressed, it is never so widely dilated and fixed, as from glaucomatous tension or compression of the ciliary nerves throughout their whole intraocular and intrascleral course.

Serous iritis is not a simple, genuine form of disease in the majority of cases. Its most common complication is serous choroiditis with diffuse lesions of the vitreous or equatorial choroiditis (cyclitis) with membranous, flaky opacities of the vitreous body. When so complicated, the process is subject to other laws, to which we shall return when treating of the choroid. As to the iritis complicating a corneal affection, as keratitis pannosa, cornea globosa, we have already explained how the primary affection influences the course and treatment. Glaucoma, due to serous iritis, affects one or both eyes, according to the causes.

Iridectomy is generally indicated in serous iritis with glaucomatous tension. Its results are satisfactory, unless owing to complications. When the iritis is accompanied by extensive disease of the vitreous, ectasies of the cornea, &c., the prognosis depends to a great extent on the complications.

Posterior synechiæ, the effects of iritis, are very often the cause of secondary glaucoma. As a general rule, we may say that the danger of ultimate increase of tension is proportionate to the extent and number of the adhesions, though occasionally glaucoma is excited by perfectly circumscribed, pointed synechiæ. The degree of danger is also influenced by various conditions, such as the age, with which it increases. On the other hand, the tension may remain normal throughout life; this is, indeed, numerically speaking, the rule even when the adhesions are numerous and extensive. As soon, however, as they *perfectly encircle* the pupil, causing exclusion,* the tension seems to me to increase almost invariably. There must, of course, be no mistake; the most careful examination will sometimes fail to show minute apertures, through which fluid will pass. In my opinion, *projection of the iritis by retro-iritic fluid is the only sign of complete exclusion.* When this state is clearly shown by the well-known prominences of the iris, glaucoma is sure to ulti-

* For explanation of this term, see Sydenham Soc. Monographs, 1859, p. 257.—T. W.

mately occur, and the patient is fortunate if it is not already present. This important fact leads us to the principle that the operation should be performed in cases of circular synechia without hesitation, even when the vision is said to be stationary,* whilst at earlier stages of the disease the operation is not absolutely necessary to prevent destruction. Glaucoma from synechia posterior, just as the primary disease, affects very often one eye, often enough, however, both eyes.

The effect of iridectomy is perfectly satisfactory in this species of glaucoma, both as to tension and vision; the diametrically opposite piece of iris must, however, be excised sometimes, in order to complete and secure the result when the adhesions are very extensive; we shall again refer to this point. The acuteness of vision will depend on the optical state and the degree of previous excavation of the disc.

An objection is sometimes raised to iridectomy, inasmuch as eyes with *congenital coloboma*,† or on which the operation has been performed for optical reasons, are in no way exempt from glaucoma. Such reasoning could certainly influence only those who have paid little attention to the pathogenesis of the disease and the effects of the operation. We have often pointed out that, in secondary glaucoma, iridectomy does not usually act in the least on the primary cause, and that it has a beneficial influence on the succession of morbid states only by diminishing the secretory irritability. Whether the effect is satisfactory or not, will depend on the power of the primary cause. If a congenital coloboma is complicated with chronic choroiditis and disease of the vitreous, or with displacement of the lens, as not unfrequently happens, the operation, however well performed, will often fail to neutralize such active causes; we must also remember that a congenital defect has very often not the same qualities as one produced by an operation for glaucoma. We may say the same in regard to previous iridectomy; such states as leucoma adhærens, synechia posterior, may necessitate the operation for optical reasons, and at a later period cause increase of tension, over which excision for the simple transmission of light may not have sufficient power. Finally, a previous iridectomy may itself promote increased tension, especially when the iris is strangulated in the wound. (*Vide infra.*)

The lens—simple cataract: it is still doubtful whether simple structural change of the lens without displacement or rupture of

* If the patient still sees relatively well, as not unfrequently is the case, it cannot be denied that iridectomy causes a little impairment (without stenopaic apparatus). A portion of the pigment-layer usually remains and acts unfavourably on the optical condition, even when the proper practice of excising the upper part of the iris is followed.

† I have also twice found glaucomatous excavation in total congenital irideremia. It was clearly due to equatorial choroiditis with disease of the vitreous.

the capsule can occasion glaucoma. I have indeed seen five times (in four individuals) glaucoma supervene during the maturation of a previously simple cataract. Careful examination had proved the absence of any complication when they consulted me; owing to the opacity of the cortex being incomplete, they had been advised to wait for some months or half a year. Acute glaucoma, presenting perfectly typical characters, broke out during this period, four times indeed in a most violent manner.* I cannot say that there was, during maturation, any particular swelling of the cortex, or any other condition having special reference to the glaucoma. I am the less inclined to admit any causal connection, because the number of cases is trifling in comparison with the total amount of cataracts observed before their maturity. Either the combination was accidental, or both affections were due to one and the same cause; for with our ignorance of the ultimate causes both of cataract and glaucoma, we cannot say that one and the same anomaly, disease of the vessels, or what you like, may not, under certain conditions, sometimes excite the one, sometimes the other disease.

The acute inflammatory character of the glaucoma is not favourable to the view that it arose from swelling of the cortex. Most cases of secondary glaucoma, except perhaps those from intra-ocular tumours, present symptoms of simple increase of tension without haziness of the media (glaucoma simplex), or of subacute inflammation (iritis or irido-choroiditis serosa remittens with increased tension). A fulminating inflammatory attack is preceded, almost without exception, by one of these forms. In our cases the attack was markedly inflammatory (four times very sudden), as already mentioned, whilst there had not been the least anomaly shortly before, when the eyes were examined (especially as to their tension) with reference to a cataract operation.

Displacement of the lens is indisputably very often the cause of glaucoma. So long as the capsule is entire, the secretory irritation is due partly to stretching of the zonula and indirectly of the ciliary organs, partly to direct molestation of the iris and surrounding parts. We know with respect to congenital dislocation of the lens, that glaucoma is no uncommon sequence. Traumatic glaucoma is also due, to a great extent, to the displace-

* Iridectomy was performed on all five eyes; the operation for cataract on four after a long interval, thrice with perfect, once with partial success. I am decidedly opposed to the performance of both operations at the same time, because escape of vitreous cannot be always avoided under these circumstances, and would be very likely to be followed by serious choroidal hemorrhage. In one of the four individuals, acute glaucoma attacked successively both eyes at an interval of five months in an almost congruous way, shortly before the cataract was mature.

ment of the lens. (*Vide infra.*) We meet, however, with perhaps the best example of this cause where the attachments of the lens are gradually destroyed through intraocular disease, such as softening of the vitreous, and where there is no increased tension until the lens is displaced to a certain degree. Finally, there are the cases in which, after perforation of the cornea and partial rupture of the zonula, but without that of the capsule, the lens is placed obliquely, pressing against a cicatrix, or after entire destruction of the zonula prolapsing into a staphyloma—generally recognised conditions on which we made some remarks when treating about projecting cicatrices of the cornea.

It is very interesting to follow in detail the development of glaucoma after displacement of the lens. It would almost seem as if trifling relaxation or destruction of the zonula, accompanied by slight variations of position or abnormal mobility (tremulousness) of the lens, presents more risk of increased tension than where the lens is entirely separated from its normal attachments and assumes an entirely fresh position. Wandering lenses—we except those that are calcified, for then there is always further serious disease—usually excite glaucoma, only when they press the iris forwards, or are strangulated in the pupil or between the cornea and iris. The greater danger of partial dislocation is probably owing to the constant stretching of the rest of the zonula and indirectly of the ciliary organs.

The symptoms are sometimes those of glaucoma simplex, more often of remittent serous iritis with increased tension. Very often the aqueous becomes clouded or any existing glaucoma becomes exacerbated, when the lens assumes a certain position, as when it pushes the iris forwards. One or both eyes are affected, according to the existing causes.

It is extremely difficult to give a satisfactory account of the treatment. Nothing can usually be expected from puncture of the anterior chamber; thus the indications are divided between removal of the lens and iridectomy. Both operations are attended with danger, and require the fullest consideration. The escape of vitreous cannot be avoided, for the anterior chamber freely communicates with the vitreous space, and the tension is increased. But any such escape is very liable to be accompanied by deleterious intra-ocular hæmorrhage when there is glaucomatous tension. Of the two operations extraction is decidedly the more dangerous, and iridectomy should therefore be preferred whenever it offers any prospect of success. It answers generally when the lens is not much displaced; when, for example, it presses a part only of the iris forwards. By excising this piece, we not only annihilate the secretory irritation hence arising, but effect important changes in the adjacent ciliary tissues, and thus oppose the tendency to glaucoma, though its primary cause remains. Chloroform is to be strongly recom-

mended, for muscular pressure much increases the danger. The greatest care must be taken that the internal wound is placed as peripherally as possible; it diminishes the risk of the vitreous, which passes into the anterior chamber, pressing the iris back and impeding its prolapse or seizure, as happened to me many times in my earlier practice. Every precaution should be observed after the operation, especially in regard to bandaging. Mishaps, as cyclitis or even retinal separation, may occur after the most successful operation; prudence is therefore necessary in respect to our prognosis. We may say by way of summary, that the majority of cases can be successfully treated by well-performed and carefully-planned iridectomy, whilst in the remainder the operation will be followed by dangerous consequences or not have sufficient effect.

Extraction is our resource, when iridectomy fails or when the lens is entirely separated from its attachments. The risk of loss of vitreous and consecutive cyclitis is far greater than with iridectomy.

We should make it our rule to attempt the extraction of both lens and capsule; when, however, the lens is in the anterior chamber and adheres to the posterior surface of the cornea, as I have often found it when the dislocation dated from the earliest period of life, the better plan is to pass the knife directly into its substance at the place of adhesion, so that it may immediately fill the wound and prevent premature exit of vitreous. I have sometimes avoided in this way any loss of vitreous. Each case has, however, such peculiarities, that it is impossible to lay down any general regulations as to the manner of extraction. A linear incision is most advantageous, all the more because it does not necessitate excision of the iris; it should be so placed as to secure as much as possible the passage of the lens, and to prevent its recession or sinking in the vitreous body. Of course we are not here referring to calcined lenses which have partially or entirely passed into the anterior chamber, and which can usually be extracted without difficulty; they result from long-continued irido-cyclitis, the eyes being blind and far more often atrophied than glaucomatous.

Wounds of the Capsule.—Swelling of the lens after this injury is very liable to endanger the eye by increasing the tension. Both discision and traumatic cataract are more prone, for various reasons, to excite glaucoma in the old than in children or young people. The lens becomes harder with advancing years, there is more secretory irritability, and excavation of the disc is produced by less degrees of tension. We find in cases of traumatic cataract considerable increase of tension (with iritis serosa) continue for weeks, even months, in children without damage to the nerve, an exemption scarcely ever observed in adults or the old. These reasons, not to mention the slow absorption of the nucleus

and the great frequency of plastic reactions, must make us more and more reticent in the use of the needle, as the age recedes from childhood. A very little swelling of a few fragments will excite glaucoma in the old, whilst, even when great and general, it generally has no such effect in the young, providing the posterior surface of the iris is not compressed for any long time.

The passage of fragments into the anterior chamber readily excites slight pericorneal injection, hyperæmia of the iris, or even plastic suppurative iritis, but not increase of tension. The latter is always the effect of pressure on the posterior surface of the iris by the swollen lens, hence *projection of the iris* towards the cornea announces the danger, and to it we must specially attend in regard to treatment. Secondary glaucoma occurs in a like manner after reclination; the effect is more pernicious, owing to the inefficiency of our means of treatment. Whilst the glaucoma after discision and traumatic cataract assumes, almost without exception, the form of serous remittent irido-choroiditis, we not unfrequently see after reclination, when the ciliary body and anterior portion of the choroid are principally concerned, glaucoma simplex, holding a very insidious course; this explains how many of the older authors, unassisted by palpation and the ophthalmoscope, considered these to be simply cases complicated with amaurosis. The tension may again diminish as the lens is absorbed, and thus the process be arrested. We sometimes notice many alternations of tension in this form of glaucoma, but then the media usually become temporarily clouded during the paroxysms of increased pressure.

The recognition and correct treatment of glaucomatous tension after injuries of, and operations on, the lens, are of the greatest practical importance. Almost as many eyes are lost after penetrating wounds by these secondary processes as by the original injuries. Proper indications and well-adapted modes of operating enable us to avoid in discision, with rare exceptions, dangerous degrees of swelling. The limitation of discision to early periods of life, the previous performance of iridectomy at the upper part in certain cases, the abandonment of the scleral operation, have had decided influence in preventing secondary glaucoma. Only one of the many reasons given for the exclusive use of keratonyxis is decisive, but this it is fully. I refer to the circumstance that the size of the capsular wound, on which the degree of swelling essentially depends, can be exactly estimated in this way, but not at all in sclerony xis. The swelling may exceed what the eye will bear, through no fault of the operator, in exceptional cases when the wound is torn more open through imbibition (in zonular or posterior polar cataract).

I generally advise not to act too hastily when the lens swells in children after discision or injury. I think that the usual

treatment is often erroneous in this respect. Children or young people can bear even considerable increase of tension for a certain time without danger; a second operation, unnecessarily performed, may readily end in an imperfect result or even failure. Besides the tension and allied symptoms, ciliary neuralgia, partial iridoplegia, &c., I always put great reliance on bulging of the iris. If the latter is entirely, or almost entirely, absent, the treatment should be expectant, all the more, the younger the child. Of course there should be no delay if glaucoma exists or is distinctly commencing. The indications are divided between simple iridectomy, extraction, and a combination of the two. The lens should always be extracted in children by a simple linear incision or by the modified linear operation, for by the time there are such dangerous results it is always sufficiently soft throughout to pass through even a small linear aperture. In patients that are older, and where the tension is perhaps due to partial swelling of the lens, it is far the best plan to excise the corresponding piece of iris, extraction being performed, if necessary, at a later time. The best incision is generally the peripheral linear one, when the patients are past their early youth, and the whole lens is at all events in process of swelling.——The result is usually quite satisfactory, providing the glaucoma is not far advanced,* though care in discision is always the best plan of securing good results. Iridectomy will very rarely arrest glaucoma after reclination: removal of the lens is attended by great danger, though, if possible, it gives the best chance.

Aphakia.—I may add a few remarks on absence of the lens. Some time ago it was often asserted that the lens had much influence over glaucomatous tension, and that its absence secured a certain immunity. In accordance with this view, extraction was earnestly recommended in the place of iridectomy; the emptiness of these suppositions was soon shown, cases of glaucoma being seen in increasing numbers where there was from congenital disease only a remnant of the lens or where it had been removed for cataract. Glaucoma may, indeed, have commenced in some of these cases, owing to swelling of the lens, and after absorption have remained as a fully developed disease; it has, however, been seen tolerably often after extraction, when, for example, the iris had been strangulated; it may also be excited by the operation for secondary cataract, as Bowman has pointed out (see the Ophth. Hosp. Rep., vol. iv, p. 365); to the latter we shall have to refer again. Finally, it has been seen in all kinds of injuries, accompanied by loss or followed by absorption of the lens. Hence it is clear that its absence does not give even partial immunity, and that its removal diminishes the ten-

* The phosphenes are of practical value in testing the field of vision when the lens strongly diffuses light so as to interfere with the usual method.

dency to glaucoma, only when there is some such state as dislocation of the lens or rupture of its capsule.

The Choroid—Acute Plastic and Purulent Choroiditis (as well as genuine, purulent hyaloiditis) do not increase the tension, except very temporarily during the stage of increment; the acme is immediately followed by very rapid absorption of the ocular fluids and diminished tension or phthisis bulbi.

Serous Choroiditis.—We have mentioned on various occasions that acute inflammatory glaucoma must be considered to be a serous choroiditis. The question remains, whether the increased tension (or special irritation of the secretory nerves) is the only symptom that distinguishes it from other forms of serous choroiditis. We see, indeed, tolerably often choroidal affections with but slight tissue-changes, characterised principally by cloudiness of the vitreous, and accompanied by iritis of exactly similar nature. There seems to be a qualitative difference between this and the glaucomatous form in the kind of opacity of the vitreous, in addition to the tension. The nature of the cloudiness of the vitreous in acute glaucoma is far from being accurately known, yet it is clear from the result of treatment that it may very rapidly and totally disappear (it is probably quite diffuse), that the proper structure of the vitreous is unaltered even after its persistence for a long time, and that the hyaloid is usually not destroyed. On the other hand, in the ordinary non-glaucomatous form of serous irido-choroiditis, the vitreous opacity, though partially diffuse, is always produced in some degree by circumscribed products, the structure of the vitreous suffers (fluidification), the septa of the hyaloid and the attachments of the lens are gradually destroyed when the disease is protracted and attains a high degree. The normal transparency is restored completely in only the minority of cases, and then slowly; yet, though we admit that there are other differences besides that of tension between these forms of inflammation, their allied nature is shown by the tolerably frequent development of secondary glaucoma in the ordinary serous variety.

We often find that serous choroiditis occasions no notable alteration in the tension throughout its course, whilst in other very common cases, attended or not by subretinal exudation, the eye is softened, and finally there is even phthisis bulbi. On the other hand, there are cases with positive variations of pressure, usually accompanied by periodical increase of cloudiness in the vitreous, and, when there is iritis, of the aqueous also, and ending in a permanent increase of tension with its various consequences. We cannot possibly say why there is sometimes the one, sometimes the other tendency, whilst both forms seem to originate in the same way. Something is due to age, and sometimes the tendency is decided by the lens, when it is mobile or permanently displaced through destruction of the zonula. This, however, is

far from exhausting the subject, and we are compelled to admit great individual differences in the secretory irritability, in order to explain the divergent course.

What passes at present under the name of serous choroiditis is a complex of different diseases. There are in the first place cases characterised principally by diffuse, only here and there delicately membranous, opacities of the vitreous, whilst the symptoms of irritation are very slight or almost entirely absent. Nothing can be discovered in the choroid itself by the ophthalmoscope, and even at a later period, when the vitreous has considerably cleared, nothing of importance. Were it not for its frequent combination with serous iritis, to which it has the closest analogy, we might readily consider it a genuine disease of the vitreous (chronic hyaloiditis), instead of of the choroid. It frequently causes a dotted posterior polar and cortical cataract, sometimes found as the effect of the disease long after the vitreous has recovered its transparency, just as dotted opacities are seen in the equatorial zone of the lens after serous iritis. The vitreous usually becomes again perfectly clear, though slowly in comparison with glaucomatous choroiditis. The zonula suffers but partially, if at all. Then there is a very general opacity of the vitreous, which is found in company with slight changes in the choroid near the equator; it is accompanied by distinct, usually remittent, symptoms of irritation, and is partly diffuse, partly composed of membranous shreds and flakes. The choroidal alterations may escape notice at first, but they appear more distinctly as the opacity becomes circumscribed and the choroidal pigment becomes more involved. Perfect restoration of the vitreous is rare; the septa of the hyaloid, sometimes also the zonula, atrophy when the disease persists. Iritis is the usual accompaniment, more often following, however, than preceding the disease of the vitreous; it is of a mixed, rather plastic than purely serous nature (posterior synechiæ are formed). Every possible variety is found between the two forms of choroiditis, a reason for including them under one denomination at present. Both may originate secondary tension, though the former type seems far more closely related to glaucoma; the latter ends much more commonly in retinal separation and phthisis bulbi, rarely leading to glaucoma, except in advanced life and when the lens has been displaced.

I must here mention an occurrence of importance, both in respect to choroiditis and also to some kinds of glaucoma simplex (*Vide infra*). It is by no means very uncommon for eyes affected with posterior polar and cortical cataract, but without a trace of disease in the vitreous, to be affected with glaucoma. Now I think there is a great probability that these cataracts result from previous choroiditis, and that, although the vitreous has cleared, the state of the choroid continues abnormal

(choroiditis latens) after the apparent termination of the primary disease; such latent disease is in my opinion the cause of the secondary glaucoma.*

Glaucoma due to serous choroiditis generally affects both eyes. Repeated paracentesis is sometimes successful; of this I had a very marked example last summer. An old lady suffering from diffuse disease of the vitreous and equatorial choroiditis, became subject to attacks of glaucoma. Almost every afternoon the aqueous became much clouded and the tension most distinctly increased, whilst for many hours after she awakened the one was perfectly clear and the other completely normal. Three days passed without an attack after the first puncture of the anterior chamber,† a week after the second, and after the third there was no return for many months, during which she was kept under observation. Paracentesis is preferable to iridectomy, but should be repeated only when the result of the first trial is satisfactory. Iridectomy is our principal means of treating continued increase of tension; on this it exercises usually a permanent effect, unless the lens is already displaced, yet in exceptional cases fresh effusions in the vitreous excite a return of the tension. In the latter event repeated paracentesis should follow the iridectomy, or a second, diametrically opposite, piece of iris be at once excised. I need scarcely mention that the prognosis is dubious even after restoration of normal tension, as the original disease may lead to destruction by progressive synchysis of the vitreous, or by secondary cataract, dislocation of the lens, and separation of the retina. No general answer can be given to the question whether iridectomy also acts beneficially on the choroidal disease. Such an effect must be admitted where

* Everyone knows that operations on eyes with posterior polar or cortical cataract are liable to be followed by unusual reactions, probably owing to the continuance of choroidal irritation. There are other reasons also for admitting such a quasi latent affection. I may note especially the appearance ultimately of choroidal changes in regions of the fundus, which correspond to earlier functional alterations. When we remember how much our diagnosis depends on the pigmentation, we may imagine how there may be many important deviations from a normal state, without any immediate ophthalmoscopic symptoms.

† I may here say a few words about the method of repeated paracentesis recently recommended, especially by Sperino. Its effect is decidedly beneficial in chronic choroiditis with participation of the vitreous. I have not repeated the puncture so soon as is recommended by Sperino, but have left intervals of three or four days, sometimes a week. A single puncture may originate progressive improvement, or cause other and previously unsuccessful treatment to act favourably. Sperino is, in my opinion, right in attributing importance to the form of the paracentesis needle; the one used by him has no angular projection, and is far sharper pointed than that in ordinary use. I must also urge strongly on my readers not to locate the puncture near the sclero-corneal boundary. Adhesions between the iris and cornea may be avoided with certainty by entering the knife flatwise $\frac{3}{4}'''$, even $1'''$, within the scleral limit, so as to place the internal wound beyond the reach of the iris.

the vitreous clears decidedly after the operation, a result, however, that is by no means constant. The tendency to fresh effusions appears to be somewhat diminished, yet other means—I specially employ repeated courses of inunction and the seton—are also required.

Thus iridectomy forms an important, though not predominant, part of the treatment when glaucoma arises from serous choroiditis; it is, however, not quite without danger, it may increase the disease of the vitreous, or even be followed by retinal separation owing to intraocular hæmorrhage; plastic cyclitis may also possibly occur.

Glaucoma scarcely ever occurs, after fluid has been effused under the retina in inflammatory processes. The only exception is presented by an extremely rare form of hemorrhagic choroiditis; it is accompanied by bloody effusions into the vitreous and separation of the retina, and it ultimately assumes the characters of hemorrhagic glaucoma (*Vide infra*). I remember only two other cases in which secondary glaucoma attended complete retinal separation. The tension is usually diminished; sometimes it continues for a long time within the normal range.

Forms of chronic choroiditis, which are generally accompanied by little or no change in the external vascularity, but are characterised by ophthalmoscopic appearances in the pigment and stroma, are scarcely ever followed by variations in the tension, and do not favour the development of glaucoma. There is the most inclination to increased tension in the specially equatorial form which is accompanied by floating, not exactly diffuse, but very extensive, opacities of the vitreous, and which is closely allied to the second variety of serous choroiditis previously described.* On the other hand, the proliferations of the pigment-layer or outer retinal layers (choroido-retinitis), which ultimately end in partial atrophy of the retina and optic nerve, do not influence the tension. I may say the same of isolated or multiple exudations on the inner surface of the choroid, which are followed by corresponding changes in the pigment. All the affections of the stroma, whatever may be the grouping of the alterations, and whether the ulterior local atrophy attacks the pigment-layer or not, appear to me to modify the tension, only when complicated with equatorial choroiditis and extensive opacity of the vitreous, or when they are extensions of sclerotico-choroiditis posterior. Two cases in which I have seen glaucoma follow disseminated choroiditis, free from either of these complications, must be referred to accident, just as the similar succession after circumscribed corneitis or cataract.

Sclerectasia posterior, and the accessory forms of *posterior choroiditis*, are often followed by glaucoma. I have adduced this

* The difference consists simply in the pre-existence and greater degree of the choroidal lesions and in the less diffusion of the opacity of the vitreous.

circumstance on a former occasion in explanation of the excessive impairment of vision in many cases of extreme myopia (Vide A. f. O., iv, 2, p. 153).* So long as all posterior ectasies were considered to be caused by sclero-choroidal inflammation, secondary glaucoma was supposed, of course, to arise from the inflammatory irritation spreading to the secretory organs. Now that we consider the primary disease to be due to stretching, though congestion and inflammation have a large share in the subsequent textural changes, the glaucoma will be interpreted in a similar manner. The process resembles, in my opinion, that in corneal ectasies; I incline the more to this view, because the posterior staphyloma involves a region through which important nerves pass.

Glaucoma complicates posterior ectasies, not only when there are extensive inflammatory changes of the choroid, opacities of the vitreous, &c.—results constituting sclerotico-choroiditis posterior in a strict sense of the name—but also not unfrequently when there is only lengthening of the optic axis, thinning of the sclera, diffuse rarefaction of the choroid, including the pigment-layer, in the posterior hemisphere, and circumscribed choroidal atrophy along the outer edge of the disc. The form is in the latter case usually that of glaucoma simplex: the media remain clear, but the tension increases, the disc becomes excavated, the field of vision contracts, generally from the inner side (there are exceptions, thus a vertical contraction from above and below is more common in this than in other affections), the central vision sinks, though usually not till the field is much contracted. This course seems partly due to advancing age; the sclera gradually offers greater resistance to expansion, and besides impeding the venous circulation, compresses and irritates the ciliary nerves as they pass through it. The occasional diminution of the myopia points to some retraction of the membrane. An hereditary tendency is the cause at other times. I have met with two families, where, after a decided increase of the myopia during childhood, this transformation of it into glaucoma took place in a number of sisters constantly between the ages of 12 and 18. I have been unable to find any cause in other cases of moderate myopia, where glaucoma came on during middle age; it is quite possible that the two affections had no causal relation, that the glaucoma was a glaucoma simplex (or a glaucoma ex causa ignota) occurring in a somewhat myopic eye.

Though glaucoma may follow simple sclerectasia posterior, yet I am quite willing to admit, that often, perhaps more often, it does not appear until there is sclerotico-choroiditis posterior in

* My experience was limited. So far I had observed this form of glaucoma almost exclusively in the old; soon after I found that it was not so restricted. I also laid too much stress on the superficial nature of the excavation—we also meet with the deepest and most typical forms.

the strict sense of the words; I mean when there are choroidal changes exceeding those of simple atrophy from stretching, spreading from, or scattered around, the original centre, choroido-retinitis about the macula, inflammatory opacities of the vitreous, &c. It would indeed be difficult to say how far the glaucoma is due to the expansion, and how far to the secondary inflammation. Whilst in simple ectasy we usually find glaucoma simplex, the second variety is followed, in the majority of cases, by the form of serous irido-choroiditis with periodical cloudiness of the aqueous, and effusions in the vitreous. We must entirely exclude the patients, in whom the glaucoma is due to such results, as dislocation of the lens, equatorial choroiditis with diffuse opacity of the vitreous.

I have already mentioned that the *excavation of the disc* does not always present the typical characters of being produced by pressure; this is noticed especially where the disc is surrounded by circumscribed atrophy of the choroid, and where there are changes due to posterior choroiditis. The steepness of the edge is the most important character of an excavation from pressure; it is essentially due to the different resistance of the disc and of the adjacent tissues; as this difference undoubtedly decreases in posterior staphyloma, so also will the steepness of the edge diminish. Accordingly, in cases of sclerectasia posterior, any excavation reaching to the margin of the disc and presenting a change in the size of the central vessels at this point, must be considered due to pressure, if accompanied by the corresponding tension and functional symptoms. No great trouble will be caused by exceptionally large physiological excavations in the diagnosis, because the existence of posterior ectasy promotes their obliteration. I refer again to this subject, because I have seen many cases during the last few years, in which the existence of glaucoma had not been recognized by most competent medical men, and the best time for operative treatment had been allowed to escape. Of course, we are met by the objection, that if the alteration in the relative resistance can prevent the formation of a typical pressure-excavation, it must delay the production of any genuine interruption in the nerve-fibres and of the corresponding amaurosis. This objection holds good in many cases: thus we often enough find no glaucomatous contraction of the visual field, &c., though the disc is moderately excavated in the manner described. When, however, there are the latter symptoms (contraction of the field, &c.), we are justified in supposing that less than the usual amount of mechanical force suffices to interrupt the functions of the retina.

Central vision is for a long time unaffected, unless the region of the macula lutea becomes diseased; the nerve-fibres passing to the fovea and its circumference, generally offer greater resistance, and do not suffer in this form of excavation till a rela-

tively late period. This is occasionally shown in a most striking manner; for example, a contraction of the inner side of the field of vision, approximating to the macula, encircles the latter in the form of two horns, one above and one below; these ultimately coalesce so as to divide the field into two parts, a small central and a peripheral temporal portion. This interesting phenomenon is not very often noticed, owing to the rapidity with which the vision, excentrically outwards, becomes impaired, so that only the little central piece is left. The latter stage, lasting for a very much longer time, is again much more often observed.* At other times the contraction, which as it approximates to the point of fixation, becomes stationary for a time in almost all cases, again progresses, and includes the centre of the field, leaving only an excentrical portion functionally active.

Although some excavations in sclerotico-choroiditis posterior do not possess any great depth or steepness, we meet with others of the most typical form. Probably the deepest excavations that are ever seen, arise in this way, especially when the choroid is not much atrophied around the disc, whilst the tunics of the eye are attenuated over the whole posterior hemisphere; the lamina cribrosa possibly offers much less than its usual resistance (the glaucoma was always simple). I have been surprised at the length of time a very deep excavation would exist in some patients without any functional disturbance; this is possibly owing to less resistance of the scleral ring. I still have a French gentleman under observation, on whose left eye I performed iridectomy seven years ago, on account of glaucoma complicating moderate myopia. The disc was even then so deeply excavated in the right eye, that the least functional change would have induced me to operate. At the present time, the excavation is one of the deepest and steepest that I have ever seen, yet the acuteness of vision is 1/1, and the field perfectly normal, so that

* Such extremely small central fields of vision are sometimes observed in glaucoma, when S is tolerably good, both in glaucoma simplex and in that from posterior ectasy. I cannot say whether they are invariably produced in the manner described, or whether they may result from progressive concentrical contraction. I have, however, not observed the latter mode. There are in general three ways in which such fields are produced: (1) by progressive concentrical contraction; (2) by the production of an intermediate zonular defect, which spreads towards the periphery, and perhaps at the same time towards the centre; (3) by lateral contraction, progressing towards the opposite side of the field, but sparing the point of fixation. The first prevails in retinitis pigmentosa, though the second is also noticed. The most characteristic example of the first is found in a peculiar atrophy of the optic nerve, at all events in its later stages. This disease differs decidedly from the usual progressive form, having the ordinary ophthalmoscopic appearances of white atrophy (at the utmost with some contraction of the central vessels), whilst central vision is unimpaired, even when the field is reduced to a few degrees of angular magnitude. I have hitherto found the third variety only in cases of glaucoma.

it seems as if the eye would still bear this state for some time longer: the tension is constantly increased, though only to a moderate degree.

The adjacent sclera may be included in the excavation; hence there may be one single depression at a certain distance, $\frac{1}{4}$ to $\frac{1}{2}$ mm. from the disc, or there may be a double bend, the one in the sclera, the other at the margin of the disc. The position of the former has no necessary connection with the local choroidal atrophy; it may from accident more or less coincide with it but far more often it is placed nearer the optic disc. When there is only a single bend in the sclera, the steepness and consequently the danger to the nerve-fibres are far less than in excavation limited to the disc; the danger, indeed, seems to be decidedly diminished by a very small strip of sclera being included in the cupping. Finally, there are cases of great elongation of the optic axis and circumscribed choroidal atrophy, in which the sclera recedes in a tolerably sudden manner at a considerable distance from the papilla (2—6 mm.); there may be no genuine excavation of the disc, its level being continuous with that of the scleral excavation. Such cases, accompanied perhaps by partial separation of the retina, have an entirely different nosological signification from glaucoma, even when they present a double bend.

Glaucoma due to posterior ectasy, always affects both eyes, and when successive, has a decided tendency to be symmetrical. So far as I remember, I have always found when it was far advanced in the one, that it was present to a less degree in the other eye.

As to the treatment, I can recommend iridectomy in the strongest manner; it appears to always arrest the glaucomatous process, and to render the non-inflammatory forms free from any injurious consequence. Any existing disease of the vitreous or displacement of the lens will, of course, affect the operation in the manner already mentioned.

I always recommend the operation to be performed at the earliest possible period. I am guided by the following considerations:—Paracentesis has no permanent effect, so no time should be lost with a trial of it. The disease appears never to become spontaneously stationary, after contraction of the field of vision has once commenced. Iridectomy may be followed sometimes by considerable, and for the most part permanent deterioration of central vision, when the contraction reaches to near the point of fixation: nerve-fibres already threatened may be destroyed by the effect of the operation. I have twice seen central pass into permanently excentrical fixation after iridectomy, and have failed to discover any corresponding change with the ophthalmoscope; a very small marginal strip of the field, in which there had been faint perception, was lost at the same time.* Finally, the pro-

* I have seen a similar effect after iridectomy, when a posterior ectasy

gress of glaucoma seems to render cicatrisation more imperfect. The very same operation was many times followed by cystoid cicatrisation in only one eye—that first diseased. I remember one case, which I saw with Professor Coccius—it was one of the hereditary cases mentioned above—where panophthalmitis, from purulent disintegration of a cystoid cicatrix, suddenly attacked the worse eye, eight years after the operation. When, however, the operation is early performed, it has a satisfactory and permanent effect, judging by a tolerably large number of cases.

I cannot say what influence iridectomy has at the same time on the posterior ectasy, because secondary glaucoma is usually accompanied by an arrest of the myopia: its influence is, at all events, very uncertain on the inflammatory results of the ectasy, such as the alterations of the choroid, the disease of the vitreous. One effect, however, is most beautifully marked, nowhere indeed better than here, where the patients are generally young; I refer to the increased range of accommodation, a rapid decrease of which was sometimes the first cause for the patient to call in medical aid. Of course, iridectomy does not exclude the treatment of the primary affection; the action of many means is indeed promoted by it. After-treatment, especially with the artificial leech, is advisable, when the tension has been only partially relieved, or when it again somewhat returns.

Retina.—Affections of the retina, infiltrative, degenerative, or functional, have usually no influence over the tension,* as we might expect from the retina being in no way connected with the nutrition of the eye. The attention of ophthalmic surgeons, however, has been called to a peculiar form of glaucoma, apparently arising from this source; I mean glaucoma succeeding retinal hæmorrhage. I cannot give any very exact statistics in respect to its frequency; as, however, I find more than twenty certain cases† noted in my journals during the last eight years, we must admit it to be more than an accidental complication or due to an exceptional course. Most of the patients were elderly, over 50 years of age; three from forty to fifty, and a single one, a little over thirty. Sometimes there was widely-distributed

was accompanied by circumscribed choroido-retinal changes about the macula. A moderately marked central metamorphopsy passed into a distinct central scotoma in one case.

* The two cases, quoted by Laqueur (l. c., pp. 54, 55) as rétinite glaucomateuse, are not conclusive. The first case did not proceed to complete glaucoma; the violent neuralgiæ, supposed by the author to be connected with increased tension, again diminished; their nature is uncertain, owing to the vision continuing good and the slight weakness present being sufficiently explained by the retinal congestion. The author himself seems to admit the pre-existence of chronic glaucoma in the second case; what disease of the retina existed, and as S was unaltered, it could be but little, may certainly be better considered the effect than the cause of the increased tension.

† Laqueur (l. c., p. 65) found it 7 times in 268 cases.

sclerosis of the arteries; various functional symptoms or alterations in the retinal vessels pointed to the same affection of the cerebral arteries in many other cases.

The disease commences suddenly with central or excentral scotomata, or even the loss of large parts of the visual field. Very often there is neither chromopsia nor photopsia; sometimes they are most prominent symptoms. The ophthalmoscope shows that this state is caused by retinal hæmorrhages, seated not unfrequently where vessels of medium or large size divide; they may occupy various parts of the fundus, though they are principally located near the disc and macula. They sometimes present a striped appearance, sometimes form irregular spots, but are rarely regularly round as in other diseases (as in the hæmorrhagic diathesis). There are always some large and dark patches, though smaller ones of a paler hue are not wanting; ruptures towards the inner surface of the retina and suffusions under the hyaloid are occasionally seen, even causing at places distinct separation of the vitreous body or hæmorrhagic opacities of the same part. The retinal veins are generally much enlarged. After continuing for some time in the same state, or even after having slightly remitted, there are fresh attacks, sometimes of a mild, sometimes of a serious nature. The extravasations are transformed after a time into whitish-yellow patches, exactly like those in nephritis, except that they are not grouped in the same way. I found in one case even the peculiar dots about the fovea. The walls of some of the retinal vessels may (as already mentioned) have been previously thickened, or they may now become so.

So far we have the symptoms of retinal hæmorrhage from arterial sclerosis with or without secondary degeneration of the tissues; such it may remain for an indefinite period, fresh effusions taking place, whilst the previous ones very gradually disappear, or the hæmorrhagic process may in time end, leaving behind it almost always partial atrophies at the places where the retina has been diseased, more or less persisting secondary patches, an altered appearance of the disc, and considerable functional impairment. In other cases—and in my opinion these cannot be determined beforehand—secondary glaucoma ensues after the lapse of $\frac{1}{2}$ to 6 months from the beginning of the disease. Its form is extremely various; sometimes there is an attack of acute inflammatory glaucoma, perhaps with fresh hemorrhage; sometimes the tension gradually increases (rarely, however, does the eye permanently escape inflammation) or attacks of a more or less acute character follow after a time the increase in tension. The pain is usually very violent, even when the tension is by no means extreme. The opacity of the vitreous is commonly of a hemorrhagic nature; that of the aqueous is often due to the same cause. Left to itself, we frequently find that a violent inflammatory attack is followed by sudden and complete blindness, and

before long by diminished tension. The blindness possibly coincides with a hemorrhagic separation of the retina. I. found such to be the state in one case, where enucleation was performed at this stage. Other cases go on to glaucomatous degeneration of the eyeball, staphyloma scleræ, &c.

My statement that glaucoma does not occur earlier than half a month after the beginning of the retinal disease, is drawn from my own experience. Coccius has published a case ("A. f. O.," ix, 1, p. 8), in which glaucoma followed in two days after the supposed commencement of the retinal process. His case is also exceptional in respect to the excellent effect of iridectomy. Possibly the interval was longer than supposed; slight retinal hemorrhages might exist for some days and not be noticed by the patient. The application of atropine might also occasion the earlier outbreak; in two of my own cases glaucoma began immediately after its use (and examination with the ophthalmoscope), though this was at a later stage of the complaint. I may add that in almost two-thirds of the cases the glaucoma appeared between the fourth and the tenth week from the first functional disturbance. Thus the probability of its following retinal apoplexy diminishes, the longer the period after the tenth week.

Fortunately for the patient, the second eye remains perfectly free from disease in almost half the cases (10 out of 22, watched for at least two years). I saw, with Dr. Manhardt, a very exceptional case where great hyperæsthesia retinæ (constant vision of sparks, flashes, smoke, &c.) appeared in the second soon after the commencement of the disease in the first eye. As the glaucomatous eye was quite blind, and after iridectomy remained tense and extremely painful, it was enucleated. This had no effect on the hyperæsthesia. Since then more than four years have passed, during which there has been no organic disease or diminution of S whilst the hyperæsthesia has gradually diminished, though it has not entirely disappeared. In 5 out of 22 cases a similar affection of the retina has appeared in the second eye soon after (or some months after) that of the first one, without being followed by glaucoma, so that the course was that of a simple senile apoplexy of the retina. Lastly, there were 6 out of the 22 cases in which the second eye was attacked exactly in the same way as the first one, and lost through the same succession of glaucoma. The eyes were usually attacked at an interval of many months; in one case, however, both became affected almost simultaneously.

I have also once seen subacute glaucoma attack an eye which had suffered two years previously from retinal hemorrhage; the latter had been cured for more than a year, the blood having entirely disappeared and the retina being partially atrophied. Supposing this sequence not to be accidental, we must admit

that arterial sclerosis continues to act after the retinal disease is terminated.

This form of glaucoma leads us again to the view formerly held, that arterial sclerosis is the essential cause of glaucoma. The discovery of its immediate cause, the increase of tension, neither supported nor contradicted that view.—In these cases it is more probable that the glaucoma is due to the disease of the arteries than to the retinal process, for the reasons already assigned.*

Although we have here good reason for attributing the glaucoma directly to the vascular disease, we have no grounds whatever for generalising and assigning the same cause to other species of it. As the rule, we find neither retinal nor choroidal ecchymoses so long as the disease is left to run its course, and even if the retinal hemorrhages after iridectomy might be supposed to be in some degree dependent on arterial sclerosis, yet we have already shown that they are proportional to the violence of the attack. This would appear to show that the retinal change does not precede, but is induced by the process. The existence of arterial disease is not proved to exist in ordinary cases, either by the ophthalmoscope or by examination of the heart and arteries. Lastly, the totally different course and the inefficacy of treatment in this form prevent us from admitting a common cause for it and the other varieties of glaucoma.

I have to add to my account of the spontaneous course that most patients suffer from the head-symptoms usual in sclerosis of the cerebral arteries, and that they often die from apoplexy tolerably soon after the commencement of the disease, as indeed they also do after simple senile apoplexy of the retina.

I am sorry to say that the treatment is very unsatisfactory, according to my own experience. Until glaucoma occurs, we may hope that the hemorrhagic process will gradually exhaust itself, and we may endeavour to promote such a termination by careful prophylaxis, mild derivatives, mineral acids, &c. This treatment may have some effect in preventing glaucoma, yet I have unfortunately learnt from experience that it may also fail. The prognosis is unfavourable from the time glaucoma appears. I had in earlier years performed iridectomy four times without any success, and had determined to abandon the operation in these patients, when Coccius's case (l. c. page 8) gave me again courage. I have since twice operated with no better result, so that I am obliged to consider success exceptional. Iridectomy generally promotes retinal hemorrhage in glaucoma, and here the natural tendency of the disease augments this effect to a pernicious degree. I have seen after the operation fresh and considerable hemorrhage making its way ultimately into the vitreous, and in one case rapid loss of what vision remained; iridectomy, though accurately performed, had at the utmost only a temporary effect in respect to the tension and pain, so that in two cases the eye had to be ultimately enucleated. Thus, I cannot recommend iridectomy in these cases, with my present experience. Enucleation is preferable if the pains continue after the

* I have only once seen glaucoma after retinitis albuminurica, and this case was one of renal atrophy from arterial sclerosis rather than of nephritis, according to Prof. Traube.

sight has been lost: by relieving suffering and restoring sleep, such treatment has probably some effect in preventing the disease in the other eye and in diminishing the risk of cerebral hemorrhage. As, however, the eyes are invariably lost when iridectomy is not performed, the publication of a series of cases, treated with this means, is certainly very desirable.*

The name *hemorrhagic* or *apoplectic glaucoma*, as referring anatomically to a definite form of disease, can of course only apply to the one described. Although the glaucoma is due to the vascular disease, rather than to the hemorrhage, yet there is, at all events, a regular succession of hemorrhage and glaucoma. Internal bleeding, with increase of any existing tension, may indeed occur in staphylomatous and buphthalmic eyes or in cases of intraocular tumours. The increase of tension is often very temporary. There was also in most cases a previous state of glaucomatous tension, which was only increased by the hemorrhage. Increased tension leading to glaucoma, is scarcely ever seen in traumatic hæmophthalmus, unless there are other complications, such as displacement of the lens. I have only twice seen glaucoma after spontaneous hemorrhagic choroiditis (both times one eye alone was affected); once in a case of hemorrhagic small-pox, where the iridochoroiditis,† which not unfrequently accompanies variola, assumed the characters of an hemorrhagic-glaucomatous choroiditis. Another time in a general hemorrhagic disease, where after epistaxis, renal hemorrhage, hæmoptoic infarctus of the lung, &c., there was hemorrhagic separation of the retina with inflammatory symptoms, and a little later acute glaucoma. Yet such cases would not suffice for the foundation of a hemorrhagic glaucoma, owing to their isolated character, and the co-operation of other causes besides the hemorrhage.

Optic Nerve.—Its diseases appear to never induce glaucomatous tension; at least, I have never seen any such effect in numerous cases of optic neuritis, the disease in which we should be inclined to most expect it. I have on a former occasion (A. f. O. viii, 2, p. 308–10) made some remarks on amaurosis complicated with glaucoma. The mutual relations of the two are still dubious; a common cause most likely educes successively the disease of the nerve and the increased tension; we cannot, at all events, attribute the production of the latter to the former.

Sclera.—It is extremely difficult to decide how far this membrane is engaged in the production of glaucoma. It can scarcely be doubted that rigidity of it is a very important *predisposing* cause,‡ for this reason we find glaucoma more frequent in hyper-

* Laqueur (l. c., p. 56) quotes two cases in which iridectomy had a satisfactory effect. We are, however, not quite certain that they really belonged to this category.

† Variola may be accompanied not only by genuine pustular ophthalmia and purulent infiltration of the centre of the cornea, running a peculiar, extremely rebellious, though not phagedenic course, but also by a sero-plastic iritis, always attended with serous choroiditis, at least the latter was always present in more than 30 cases that I have seen. *Simple* iritis perhaps never occurs, is at all events extremely rare. Posterior polar and cortical cataract may be caused by the accompanying disease of the vitreous, and will persist after the other symptoms have entirely disappeared.

‡ Stellwag von Carion (Der intraoculare Druck und die Innervationsver-

metropes and the old. On the other hand, we are still quite ignorant how far the sclera may form the direct, so to say, active origin of glaucoma. Many authors (Coccius, Cusco,) * have published facts and considerations with a view of showing that it has a very important influence in this respect also. The case reported by Coccius † in this Archiv. (vol. ix, 1, p. 19) is of very great interest in this respect. Yet the reliable data hitherto adduced in proof are very few. Admitting that differences in the resistance of the sclera have great influence over the production of the pressure-excavation, that it is perhaps owing to them that glaucoma occurs in the old under conditions which the young can bear without injury to the disc, and that the ciliary nerves from their intrascleral course (scleral passage) may readily become the source of abnormal irritation; yet all these points still require thorough examination, from which we may perhaps derive most important conclusions hereafter.

Intra-ocular Tumours.—We shall conclude our review of the different forms of secondary glaucoma with the mention of that caused by intra-ocular tumours. This variety has been already sufficiently discussed in various publications; the gliomata of children sometimes lead to gradual increase of tension or to glaucomatous attacks, though not until the neoplasm is of large size, so that the diagnosis is not obscured by the symptoms of glaucoma. Moreover, attacks of inflammatory glaucoma are much rarer than plastic irido-choroiditis with transitory phthisis bulbi when the tumour is breaking up. Glaucoma is excited far more often by sarcoma of the choroid or ciliary body in adults or the old; this may happen even at an early stage, and may then throw difficulty in the way of diagnosis.‡ Separation of the retina does not prevent glaucoma in these cases. Sometimes the tension continues tolerably normal until the glaucoma breaks out as

hältmisse der Iris, p. 41) seems to me to generalise this predisposition too far, when he says, "It is now settled, that glaucoma, strictly so-called, occurs only in eyes with a very rigid capsule." A glance at secondary glaucoma which may occur with all possible previous conditions of the sclera, especially at the form accompanying posterior ectasy, sufficiently shows the absence of this cause in very many cases. That the sclera is usually rigid after the persistence of glaucoma for a length of time, must be used with great caution in respect to the pathogenesis, for the nutritive changes accompanying increased pressure may indisputably exercise a (consecutive) influence on the structure of the sclera.

* Cusco bases glaucoma in general on a chronic inflammation of the sclera, with retraction of its tissue. To support this view, anatomical data would be indispensable, yet, though the author appears to possess some such, I do not find them anywhere adduced.

† Coccius found in two eyes, on which he had operated a year previously for glaucoma, extensive fatty degeneration of the sclera, most decided towards the equator. He considers this to be the effect of previous inflammation of the scleral connective tissue.

‡ See on the points guiding our diagnosis, A. f. O, xiv, 2, p. 116, and following.

a sudden inflammatory attack; generally, as the tumour enlarges, the tension increases, and when it exceeds a certain degree, there there is a subacute or acute attack. Atropine, which we are so likely to use in such cases for the purpose of diagnosis, is very liable to excite a violent attack.* As the primary disease scarcely ever affects both eyes, the glaucoma follows the same rule. Iridectomy either fails entirely or has only a temporary effect, so that we are obliged to have recourse to enucleation.—I have also twice seen glaucoma after exophthalmus from orbital tumours: the immediate cause was, however, in both cases secondary disease of the inner membranes (choroido-retinitis, or with intra-ocular effusions).

Simple Glaucoma, its nature.—The doubt felt in former days whether the same process could excite both the inflammatory changes of typical glaucoma and simple increase of tension, has now been partially removed by our fuller knowledge of secondary glaucoma and by recent alterations in the theory of inflammation. When we see in secondary glaucoma, for example after displacement of the lens, one day simple increase of tension, and the next day inflammatory cloudiness of the media, alternating just as the cause acts more or less intensely, we may be certain of the essential identity of both forms and that they are due to modifications in the intensity and duration of the cause. If we admit the form with cloudiness of the media to be inflammatory, we cannot, I think, deny that the other, which is so closely allied, is also of the same nature, although, for the sake of distinction, it may very well be called the "non-inflammatory," or "simply secretory" form. The supposition of a simple difference in degree is supported by Cohnheim's theory, according to which inflammation is essentially a species of abnormal secretion. If the cause acts rapidly and powerfully on the vessels, so that the cellular elements pass abundantly into the ocular media, the haziness becomes perceptible; whilst if the cause acts more slowly and less intensely, the cloudiness is not sufficient to be recognised. A very little addition will then render it visible, such as, for example, is produced by the congestion after meals.

The real difficulty in respect to glaucoma simplex arises from our *ignorance of any immediate or remote cause.* In secondary glaucoma we find, in one or the other tissue, a stimulus exciting hypersecretion, and as the former is usually permanent, so also is the effect. If temporary arising for example, from a swollen lens, the tension may also again diminish, though if the latter has attained a certain degree and duration, it will persist after removal of the cause; it is doubtful whether this is due to persistent irritation of the secretory nerves or to a continued

* Dr. H. Derby has also published a number of such cases, as we have already mentioned.

pernicious reaction by the anatomical results of the increased tension. We can understand how a typical inflammatory glaucoma may leave changes, such as contraction of the emergent veins or alterations of the ciliary nerves, so that, even without a recurrence of the inflammation, the pressure persists and leads to destruction. When there are recurrent attacks of inflammation, we feel more acutely our ignorance of their causes, though, as in other forms of recurrent inflammation, we may refer them to remote conditions and processes in the organism. But when, as in glaucoma simplex, the pressure augments very gradually for months or years (though depending anatomically on the same, but less intense, processes), always advancing and never diminishing, we naturally ask where is the continued stimulus that causes this course. Even if we admit an idiopathic affection of the nerves from some extra-ocular source, it would still be very surprising that the tension never diminishes again. *A priori* it is far more probable that the cause is *intra-ocular*.

Variations in its Course.—The results of *treatment* force us to admit a *latent intra-ocular* cause for glaucoma simplex and lead to the opinion that this cause is subject to fluctuations. Whilst the operation has a perfectly uniform effect in simple inflammatory glaucoma, whilst in secondary glaucoma its various results may be naturally deduced from the nature of the primary cause, we are obliged to admit that cases of glaucoma simplex vary extremely in their ultimate course, even when the pre-existing conditions appear to be exactly similar. The result is often very satisfactory in a relative sense, when the operation is performed at a late period; I mean that after six or seven years the patients continue to see decidedly better than at the time of the operation; in some, operated at an early period, the vision remains for many years in the same state, then gradually deteriorates; in some, again, the disease is not rendered perfectly stationary; and finally, some, fortunately very rare, patients become rapidly blind after the operation. When we accurately determine and record the tension, we find that these differences more immediately depend upon its variations. Thus iridectomy reduces the tension directly and permanently to its normal amount in most cases of simple glaucoma. It reduces it considerably, but does not render it quite normal in others; the vision usually continues in the same state, the eye acquiring, as it were, a sort of adaptation to a moderate increase of tension; yet not unfrequently the sight becomes again worse after a time, or the pressure again increases slightly and gradually, until in either event by a second operation, which I shall afterwards describe, it is rendered permanently normal and the vision secured. In a third series, the tension is normal or but little increased soon after the operation, whilst at a later period there are from time to time considerable increases, which do not always permanently yield to a second operation.

Lastly, iridectomy is sometimes followed by greater instead of less tension, the result being that vision is lost by progressive impairment or by a sudden attack resembling acute glaucoma.

Hence it would almost seem as if iridectomy had such an uncertain effect in simple glaucoma as to render its indication doubtful. This conclusion is found to be quite erroneous when we consider the numerical distribution of the varieties described. It has been already mentioned that in more than half the cases, a single operation renders the pressure permanently normal, and not only preserves, but even gradually improves, the vision for a long period. The second category includes fully one-fourth of the cases, and though our object cannot be said to be fully attained, yet the result is generally satisfactory: it may be necessary to repeat the operation is some few cases in order to secure permanent success. A second operation sometimes stops the progress of the blindness in the third category where the disease recurs; it at all events renders the deterioration slower in comparison with the spontaneous course. The last variety alone is thoroughly unfavourable, blindness being hastened by the operation. Yet this "malignant" course is extremely rare: I have seen it fully developed only five times in some hundred cases of simple glaucoma on which I have performed iridectomy. Judging not only by my own practice but also by that of others, it does not form two per cent. of the cases of glaucoma simplex submitted to operation. Now an operation that gives permanent protection from blindness in more than 90 per cent., renders the course slower in the majority of the remainder, and does harm in less than two per cent. is indisputably indicated, though exceptional bad results, such as never occur in an analogous manner in inflammatory glaucoma, may necessitate prudence in the prognosis.

The effect on the tension is reflected in a very instructive manner in the behaviour of the eye, even during the first few days, in part *immediately after the operation*. Whilst, as already mentioned, the tension in inflammatory glaucoma is rendered uniformly normal, with the exception that it may be moderately increased during the beginning of the healing process and that there sometimes remains a slight excess, quite compatible however with permanent success, the wound rapidly heals, and the anterior chamber is refilled immediately after the operation, or in a few hours, exceptionally not till some days afterwards, the state is quite different in simple glaucoma. If we make it our practice to examine each eye immediately after iridectomy by palpation, of course with the necessary delicacy, we shall find that the resistance varies much in glaucoma simplex. Some eyes are almost as soft as (even softer than) the average normal eye after it has been punctured, in others the tension remains greater than it ought to be in the normal eye

before it is punctured. We find every degree of abnormal tension between the two. Now the anterior chamber will not be rapidly reformed when the tension immediately after the operation is considerable; the chamber will not refill till the third, fourth day, or later, even when the tension does not reach quite such a height, though decidedly exceeding that of a punctured eye. If, on the other hand, the resistance is but little greater than that of a punctured eye, the chamber is permanently refilled (the incision being made with the lance-knife) immediately or very soon after the operation. The unfavourable results, noted above, occur when the chamber is slow in refilling. The pressure may even increase somewhat for a few days, during which time the iris and lens are pressed against the cornea, which consequently becomes somewhat hazy in most cases, the eye waters, the congestion is pericorneal and peculiar, due principally to enlargement of the anterior conjunctival veins which do not run in straight lines in their usual manner, but bend at obtuse angles; their inosculations with the episcleral vessels, which are also much congested, are likewise very noticeable. Palpation, especially of the ciliary region near the wound, is painful, and the patient complains of more or less ciliary neurosis and loss of sleep; vision decreases in an alarming manner. The chief danger, when the anterior chamber does not refill, is caused by a *consecutive increase of tension* (*with symptoms of irritation*), on which the other symptoms obviously depend. The danger is less when there is *no irritation*, that is, when pain on palpation (not spontaneous ciliary neurosis, which is caused directly by the increase of tension), lacrymation, and marked congestion (of which the character is determined ultimately by the state of the tension) are absent; the eye usually becomes softer in some days, and though the chamber does not refill till the second week or later,* yet afterwards the course is tolerably satisfactory in most cases. If there is no irritation and the tension is but little increased whilst the chamber keeps empty, we may expect that the aqueous will begin to appear again in a few days, that a little later the chamber will be quite normal, and that the result will be satisfactory.

Though a signally *malignant course* is observed in less than 2 per cent. of the cases of simple glaucoma treated by operation, yet in a much larger proportion, about 10—12 per cent., the chamber is slow in refilling (after the second day), owing to the tension being relatively too great. About one-half of these present symptoms of irritation, which are, however, generally slight, and fortunately disappear under proper treatment, as

* Very different are the cases in which the chamber remains empty for a long time owing to irregular healing of the wound (cystoid cicatrix). The tension may then be perfectly normal, the eye, indeed, is often abnormally soft; such a delay, when the tension is normal or diminished, does not involve the least danger, apart from the abnormal cicatrisation.

the chamber refills and the tension decreases. Yet here we find almost all the cases in which the reduction of tension is incomplete or is followed by a fresh increase.

Returning to the "malignant course," we may add that it presents various forms. The irritation may steadily increase during the first few days after the operation, the tension may become so great that the eye, though the anterior chamber is empty, presents a stony hardness, and even the last trace of vision is lost. The cloudiness of the posterior surface of the cornea and a diffuse haziness of the vitreous, which certainly exists, prevent any accurate examination of the fundus. No vision ever returns, though some weeks later the pressure decreases and a shallow chamber reappears. We then find a tolerably diffuse, delicate opacity of the vitreous or retinal separation: I have seen the latter follow in two cases, whilst the tension was decreasing; once indeed the vitreous had been punctured. Sometimes the anterior chamber is permanently obliterated owing to adhesion of the iris and cornea, though the tension ultimately decreases. In other cases the symptoms of irritation may not be so great, or they may remit to a certain extent, yet the chamber continues empty, the tension persists, there is more or less abnormal irritability, and the vision is gradually lost, just as in progressive glaucoma, the field contracting, &c. There can be no doubt that the operation excites a fresh and more acute glaucomatous process, which does not present its ordinary symptoms simply owing to the complete absence of the aqueous humour. Judging by the painfulness of the ciliary region near the wound, this process would appear to spring from irritation of the ciliary body; a further ominous feature is the sympathy of the other eye, even after it has been already operated with success.* I have

* Remark. I shall never forget the case of the Dutch apothecary, G., on whose left eye I first operated for advanced glaucoma simplex with contraction of the field of vision. The chamber did not refill till the seventh day, whilst the tension, which had been at first very ominously increased, had gradually lessened on the fourth and fifth days; there were no marked symptoms of irritation. The case belonged to the second of the categories described above, in respect to the tension. It continued a little too great, yet the vision, which had distinctly deteriorated before the operation, now became stationary. Six months later, the patient returned for the operation on his right eye, which now presented just the same symptoms as the left had done. The operation was perfectly regular; after it the tension was very considerable, the chamber continued empty; on the second day there were symptoms of irritation of the kind already mentioned, which were followed by increase both of them and of the tension, with rapid impairment of his sight; next week, sympathy of the left eye, in which there now appeared an ominous congestion, with dilated anterior conjunctival and episcleral vessels; on both sides progressive blindness (with the symptoms of glaucoma modified by the absence of an anterior chamber). The patient was too much discouraged to submit to any attempt to arrest this process by further treatment. There had been clearly some such tendency in the left eye, as the chamber did not reform till the seventh day.

failed to find any reason for this course, either in the manner of performing the operation, or in the personal peculiarities of the patient.

I wish to call attention to the fact that I have seen this course exclusively in *glaucoma simplex* strictly so called (apart from a glaucoma secondary to displacement of the lens, also without haziness of the media), *i.e.*, only where no periodical obscurations of the media could be found by careful and repeated examination. I may say the same of the analogous cases in which the chamber is late in refilling, where the tension remains increased for a long time after the operation, and where there are symptoms of slight irritation. I have never seen such a course in cases of inflammatory or subacute glaucoma with periodical cloudiness of the aqueous humour. I must also add, that all the eyes in question were *very tense* before the operation. There appeared to be in some a peculiar cloudiness of the subconjunctival connective tissue, so that the swollen muscular or anterior ciliary vessels presented a peculiarly dull hue; this point, however, requires further attention.

Hence there must be a difference—and here we return to the subject with which we commenced our remarks—between apparently similar cases of simple glaucoma, owing to which the very same operation may diminish the tension immediately and sufficiently, imperfectly or not quite permanently, or on the other hand may excite a sudden and pernicious increase. We have already learnt that there are cases of secondary glaucoma clearly arising from an intra-ocular cause, in which the latter can be determined only by the antecedents. Such is the form that occurs with posterior cortical cataract after serous choroiditis, at a time when its principal effect, diffuse obscuration of the vitreous, has passed away; such also is the one following retinal hemorrhage at a time when every trace of the latter has disappeared. Just as in these cases the cause of glaucoma is latent when the operation is performed, so there may be causes of simple glaucoma, which escape our notice; a great part indeed of the structural and circulatory changes, which affect the eye, are not directly accessible to our present means of examination. We have already spoken many times about choroiditis latens, *i e.*, about choroidal changes which cannot be shown objectively at every stage, but which are demonstrated by the course of the disease. It is in this way alone that we can account for the peculiar reactions after operations on certain forms of cataract. It is quite certain that there are diseases of the vitreous without any ophthalmoscopic symptoms whatever; thus when the lens is very mobile, passing sometimes into the vitreous, sometimes into the anterior chamber, we cannot doubt that the vitreous is unnaturally fluid, and yet we are assisted to this conclusion only by accident.

Important parts, such as a portion of the ciliary organs and the sclera, which are very likely to participate in the genesis of glaucoma, cannot be directly examined. The absence of inflammation in simple glaucoma harmonises with the view that it arises from a tissue with very sluggish nutritive changes and a peculiar vascular torpidity. The differences in the course of the disease

and in the results of treatment, may readily be imagined to be due to the implication of particular parts of the sclera, a membrane largely connected with adjacent tissues, and through which various vessels and nerves pass. As in other disturbances of innervation we attend especially to those portions of the nerve passing through bone or tendon (numerous cases of neuralgia and paralysis are now-a-days referred to periosteal irritation at those spots, &c.), so in respect to the ciliary nerves their passage through the sclera seems to me to deserve a thorough examination. I should suspect senile rigidity or pathological contraction of the sclera, because of the interference with nerves containing secretory fibres, and not because it directly compresses the contents of the eyeball, nor yet because the venous circulation is impeded or obstructed (see Stellwag, l.c., p. 43).

It is a doubtful proceeding, when we are without positive data, to employ hypotheses. Yet, apart from the fact that they are likely to give the necessary impulse to investigation, it seems desirable to us to form such views of simple glaucoma as will not contradict current pathological doctrines and analyses in respect to other forms of the same disease. For these reasons we must suppose, in my opinion, that there is a permanent stimulus in the eye; we are also obliged, owing to the entire similarity of the course and effects of treatment, to consider the disease a *secondary glaucoma* with a varying or at least not uniformly localised *intra-ocular cause*. The cause itself is still doubtful, yet for various reasons special attention should be directed to the sclera in future clinical and anatomical researches.

Glaucoma simplex affects, almost without exception, both eyes successively, indicating that the cause also is symmetrical. Iridectomy is the principal means of treatment. Paracentesis has no permanent effect, though it possibly may be of use in regard to the prognosis. If it reduces the tension nearly to that usually found in a punctured eye, we may be certain that iridectomy will have a permanent effect, and that there is no tendency to a malignant course, or even to an insufficient result of the operation. If again the hardness continues relatively great, the anterior chamber will be slow in refilling and the course will be threatening, though malignant only in a minority of patients. Possibly a methodical repetition of the puncture would reduce the tension, and thus, as the puncture itself has no permanent effect, prepare the way for iridectomy. I cannot, however, yet say whether such a proceeding will succeed, or whether in cases where iridectomy is followed by a malignant course, paracentesis itself would be attended with the same risk. As to the iridectomy, I need scarcely repeat that, in order to reduce the tension with the greatest possible certainty, the usual rules about size and peripheral position (and the avoidance of adhesions, to which we shall return at the end of this essay) must be strictly observed in

cases of simple glaucoma. The disease differs in this respect from inflammatory glaucoma, where carelessness in the operation is often enough followed by no injurious effect. The after-treatment, which presented no peculiarity in the inflammatory form, here requires much consideration. The tension of the eye should be carefully examined immediately after the operation, or if chloroform is used, as soon as its effects have disappeared. When the tension scarcely exceeds the average resistance of a punctured eye, we may expect that the anterior chamber will be soon refilled, and even should this not occur for some days, that the course will be satisfactory with the usual treatment. The continued use of the charpie-bandage is advisable for the prevention of cystoid cicatrisation; atropine may also be applied from the second day with advantage. On the other hand, if the tension exceeds considerably that degree, the eye must be simply closed with plaster. I am firmly convinced that a *bandage applied to a relatively tense eye, decidedly increases the after-danger.** The slightest pain should be opposed by a subcutaneous injection of morphia in the temple. If next morning the pressure is not decreasing—the chamber will, of course, still continue empty—occasional tepid fomentations with chamomile infusion, a purging powder of calomel, and in plethoric people venesection, are advisable. The fomentations, powder, and subcutaneous injection should be repeated during the following days according to circumstances. If the pressure is once decidedly diminished, we may calculate on the chamber being soon reformed, and on the course being tolerably satisfactory, unless the vision has already exceptionally decreased. I do not recommend atropine in these cases during the first few days, because, with the existing tendency (as in chronic glaucoma) it may excite an acute increase of tension. These means during the first few days not only counteract the tendency to a malignant course, but conduce to the completeness and permanency of the reduction of tension, on which the future fate of the eye depends. As already mentioned, the very eyes in which the pressure is insufficiently reduced soon after the operation, are usually the most prone to ulterior deterioration or recurrence.

Supplementary Iridectomy.—If, notwithstanding all this care, the vision becomes again worse after it has been stationary for many months, and the tension increases or recurs, the first means, provided the latter is not very great, should be occasional local blood-letting by the artificial leech. I have already on a former occasion recommended this treatment to be pursued some months after the operation, and can now repeat, what I then said, in respect to many cases of simple glaucoma (and of secondary

* Remark. Moreover, if it is applied after irritation has commenced, to a tense eye with an empty anterior chamber, it may excite most alarming symptoms.

glaucoma from sclerotico-choroiditis posterior). The favourable effect of this treatment is again a reason for believing that this affection is due to some intra-ocular irritation. Should this means fail, it might be a question whether we should have recourse to paracentesis, methodically repeated; my own trials, perhaps not sufficiently carried out, have not given any decided results, and for some years I have abandoned them, because I found that excision of a diametrically opposite piece of iris very decidedly reduced the tension of the eye. I shall treat this subject, already repeatedly mentioned in this paper, specially here, because it is most frequently indicated in simple glaucoma. Many comparative trials in the years 1865-67 proved that excision of the opposite piece of iris had a far more decided effect on the tension than that of the adjacent (even extremely large) portion of iris. These trials were made a few times when both eyes were in almost exactly the same state; the result was decisive, for excision of the adjacent piece had afterwards to be supplemented by that of the opposite portion of iris. I must indeed confess that I have become dubious whether excision of the adjacent piece has any influence over the tension; it is at all events very slight, and will generally not suffice in cases where the first iridectomy has had no sufficient or permanent effect. On the contrary, I could adduce at least a dozen cases, where excision of the opposite piece has had a permanent effect after failure of the first iridectomy. The following case, seen by me and also by Donders, may serve as an example:—

Mrs. H., thirty and some years old, rather delicate and anæmic, had both eyes operated upon by Donders in September, 1866, on account of simple glaucoma. As there was then only some quantitative perception in an excentrical portion of the visual field of the left eye, the operation was performed, rather to prevent future trouble than on account of the sight. On the right side the condition was, according to Donders' note, tolerable, S = about $\frac{1}{3}$, and the field of vision having only lost about its lower third. In December, 1866, the patient changed her residence, and was recommended to come under my care by Donders, who stated that the tension, notwithstanding a perfectly normal course after the operation, had never decreased quite to the physiological limit, and that the vision also had become gradually worse. I found in each eye a perfectly regular broad coloboma at the upper part and reaching quite to the periphery, an almost typical excavation, extremely steep towards the temporal side, with marked distension of the veins beyond the edge, the tension a little greater than the physiological extreme; on the left side the vision was almost lost; on the right side S $\frac{1}{5}$; almost the whole lower half of the field of vision was wanting: a line limiting it passes just below the point of fixation, extends horizontally to the inner, and slightly downwards to the outer side, so that a small portion of

the outer and under quadrant remains. Further observation showed, that there were from time to time neuralgic pains in the forehead and temples, during which the tension slightly increased. A few times I discovered also very slight cloudiness of the aqueous during these pains, which, by-the-way, had never the characters of genuine paroxysms. The artificial leech was applied occasionally, the patient was kept in a state of perfect rest, all injurious agents were avoided and mild laxatives administered; the vision became no worse from December, 1866, to February, 1867, although the tension did not decrease. This stationary condition proved to be only temporary. She was then watched alternately by Donders and by myself; soon after the treatment described, and notwithstanding the use of various other means (whey-cure, subcutaneous injections of morphia, &c.), the vision was found to be gradually becoming worse.

When she returned to Berlin in November, 1867, S had sunk to $\frac{1}{16}$. The change in the field of vision was relatively less; the line limiting it now passed through the point of fixation, extending inwards somewhat above, and outwards coinciding with, the horizontal line drawn through the same point. The excavation and the tension were unaltered. In the following three weeks, during which mild derivatives were used, the vision became seriously worse, so that at the beginning of December, 1867, S = only $\frac{1}{24}$, and she began, when looking at even small objects, to use an excentrical part of the retina. Convinced that the progressive deterioration was due, neither to any complication, nor to an independent advance of the secondary atrophy of the optic nerve, but simply to the continuance of a *relatively* (and also in some degree absolutely) too great tension, I excised, on the 4th December, 1867, a second piece of iris at the lower part. The tension was immediately after the operation similar to that of a punctured eye, and the chamber refilled at once. Even during the first period of healing the tension was in every respect very favourable; it was not only below the physiological maximum, but scarcely reached the normal average, where it remained constant. It was now very instructive to compare the left eye, both as to the tension which gave an excellent index of that previously existing in the right eye, and as to the excavation. The latter had been nearly the same on both sides; it now strikingly diminished in the right eye, where its nasal edge almost entirely disappeared; its temporal side (previously extremely steep, as it still is in the other eyeball) became gently inclined, and the marked difference in the size of the veins within and beyond the excavation, was almost completely lost. The vision was still more satisfactory: instead of a gradual impairment, it slowly but steadily improved. In February, 1868, eight weeks after the second operation, S was again $\frac{1}{20}$, the field of vision slightly larger; six months after the operation, S $\frac{1}{16}$, field of vision still

larger; a year and a half after the operation S $\frac{1}{1\frac{1}{2}}$, the line limiting the field of vision passes a little below the point of fixation, extends horizontally inwards, but reaches to the outer side as far down as to include within the percipient region fully the upper third of the outer and under quadrant. The tension is perfectly uniform; it certainly does not exceed the physiological average, and of course is widely different from that of the left eye. The periodical pains no longer return.

With such experience, I am more particular than ever in insisting on a *sufficient reduction of tension after the operation for glaucoma*. If after the operation the tension exceeds the physiological average—in which case there may well be a relative increase—or the physiological maximum, and the vision shows the least tendency to become worse, I should have no hesitation in advising a second operation. Of course, the earlier it is performed the better will be the result. The second must be performed exactly in the same way as the first operation.

Let us now return after this survey of the various forms of glaucoma, which unfortunately exposes at the same time our ignorance of many and important points, to certain details, which could not be previously treated without interrupting the continuity of our narrative.

Traumatic Glaucoma.—The question has been raised in respect to the causation, how far this affection can be attributed to a traumatic source. The answer will be decidedly affirmative, if we include not only its direct production by a traumatism, but also its indirect development in the form of a secondary glaucoma. For example, when the capsule of the lens is ruptured by an injury, the swelling may be followed by glaucoma. If the injury ruptures the zonula, and thus cause mobility or real dislocation of the lens, glaucoma is produced, just as after a spontaneous displacement.* If, moreover, there is a penetrating wound of the cornea with strangulation or prolapse of the iris, the case presents conditions which are extremely active in promoting glaucoma, as we have already learnt. Foreign bodies, passing into the eye, may excite iritis and adhesions, and be then followed by the same disease. It is a very rare, though not quite impossible, occurrence for the hemorrhagic and hemorrhagic-inflammatory states which follow a *single* violent blow and which are usually accompanied by separation in the continuity of one or the other membrane, to cause glaucomatous tension, unless there is some permanent irritant (foreign body, rupture of the capsule, dislocation of the lens, strangulation of the iris, traction by a cicatrix). Traumatic

* The glaucoma may be erroneously supposed to be primary, owing to the true cause being overlooked when the tremulousness is only slight.

inflammations far more frequently assume a hyperplastic character, and either do not influence the tension at all or only in a negative sense. Very different is it in respect to its direct causation by the traumatic irritation, and not by any other intermediate state in the eye,—when it is developed after a simple contusion through an affection of the secretory nerves, &c. Such a course is extremely rare, if indeed it ever occurs. Increased secretion seems to occur principally when an irritant *continues to act* for some time, whilst a sudden violent traumatism is far more likely to produce a species of secretory paralysis with negative tension of the eye. The trauma acts in the way first mentioned by the intervention of some of the secondary causes previously mentioned.

I have indeed occasionally met with perfectly typical glaucoma, which was attributed by the patient to some traumatic cause. Thus one case was asserted to be due to a cannon-ball striking near the patient during the last war, another to fragments of a bullet flying past near the eye, another to lightning striking close to the patient, &c. We must be very cautious in admitting the correctness of such opinions, for, as such influences as mental excitement, loss of sleep, &c., usually present in these cases, are by themselves not unfrequently followed at once by glaucoma, we may well doubt the predominance of the injury and suppose that the latter has simply acted on a predisposed patient in the way of an exciting cause. It is scarcely possible for an injury to directly cause glaucoma in a perfectly healthy eye; the close causal relation which exists in traumatic paralysis and neuralgia cannot be admitted in glaucoma, a result which may perhaps influence in some degree our conception of this disease.

Glaucoma after Operations.—We may here add a few remarks on this subject. Some of the intermediate links, which, as we know, are the immediate causes of secondary glaucoma, may almost invariably be discovered in these cases. The most decisive, and at the same time most common, examples of this are furnished by discision and reclination of the lens. Next we should quote anterior and posterior synechiæ. We have always been opposed to methods of operating (encleisis, iriddesis, &c.), the object of which is to produce anterior adhesions. I also think it very important to oppose any accidental inclusion of the edge of a coloboma in the wound, especially where there is any increase of tension. I believe—and shall return to this point—that the avoidance of anterior and posterior adhesions is of fundamental importance in the operation for glaucoma. There is relatively little risk from a few posterior synechiæ when the coloboma is large, though they may keep up an increase of tension when such a tendency is present. When the operation is performed at a late stage of chronic iritis, in cases of circular synechia, retro-iritic proliferation, when the periphery of the iris is applied to the

cornea, and when at the same time the peripheral portion is not excised or the proliferations on the posterior surface of the iris are irritated, fresh adhesions may be occasioned through the operation and increase the tendency to secondary glaucoma. The peripheral incision for the extraction of cataract also requires care in this respect, so that adhesions of the iris in the wound, which were formerly so common, may be reduced to a minimum and to the less dangerous forms (adhesion of the periphery alone, the sphincter being completely returned). The glaucoma, which used to be occasionally seen after flap-extraction, arose from remnants of cortex, from prolapse of the iris, from chronic iritis, and iridophakitis with adhesions. I only remember once seeing acute glaucoma immediately (next day) after a normal flap-extraction; this was possibly accidental, or perhaps the operation acted simply as an exciting cause in promoting an early outbreak.

Glaucoma after the Discision of Secondary Cataracts is relatively common: any fresh operation may excite secretory irritation after reclination of the lens, through slightly changing its position. Glaucoma is, however, by no means rare after extraction or discision; Bowman (Ophth. Hosp. Reports, iv, 4, p. 365) has called attention to this point. I think this succession may be attributed to two causes: secondary cataracts contain not unfrequently within the collapsed capsule remnants of cortex, which, after a fresh operation, are liable to swell and irritate the posterior surface of the iris and ciliary organs, especially if the pupil is small. Unless great care is taken, there may also be some displacement of the capsule, with traction and irritation of adherent ciliary processes, especially when the capsule is tough, not diaphanous, but forming an opaque membrane or presenting opaque stripes. These causes may account for glaucomatous tension, usually with a little cloudiness of the aqueous, appearing immediately or gradually. I think that any such complication may be avoided by proper care. In the first place, the capsule should never be divided, not even punctured, when the pupil is small and resists mydriatics.* Hence Bowman saw this form of glaucoma far more often in cases of secondary cataract after flap-extraction than when the original operation had been combined with iridectomy.

When an operation for capsular cataract is indicated under such conditions, the pupil should be sufficiently enlarged by an iridectomy at the upper part. If, as sometimes happens, one iridectomy does not suffice, there should be no hesitation in ex-

* Remark. This is still more important in discision of the lens itself. Especially in congenital cataract is it bad practice to open the capsule without a preliminary iridectomy, when the pupil is small and dilates with difficulty. In many of Bowman's cases, iritis with circular synechia intervened, there being noted not only "a general projection of the iris," but "partial bulgings," which are found in circular synechia alone.

cising the diametrically opposite piece before the capsule is touched. Should there be any reason to suspect the existence of cortical remnants, our next step will be to make a perfectly simple and not too extensive linear incision in the capsule; a fresh operation, that usually required is a freer discision, should not be performed until the fragments of the lens have been absorbed. The best direction for the incision in the capsule is along one diameter; this usually suffices for optical purposes in the translucent forms; if, when the needle is withdrawn into the anterior chamber, the wound does not sufficiently gape, it must be enlarged, care being taken not to approach the edge of the pupil and not to cause any traction of the ciliary organs. No special rules can be given, the resistance of the different parts of the capsule deciding the direction.

It is very important to attack the very translucent and yielding parts alone. To tear by force or to partially displace tough opaque capsule, whether by one or two needles, is attended with danger; I would not recommend at all events those who possess some vision to submit to treatment which may not improbably cause deterioration, even loss of the eye. It is much better, when there are striped (consecutive tissue) membranes, to perform a peripheral iridectomy in the direction in which they become diaphanous, and then to simply divide this transparent portion. By following these principles,*—and these lengthy details may be excused owing to the importance of the subject,—I have avoided for many years glaucoma (and any unwelcome reaction) after operations for capsular cataract.

The most enigmatical effect of any operation in regard to glaucomatous tension is the malignant course of a few cases of glaucoma simplex after iridectomy. The very operation, which usually acts beneficially on excessive tension, seems here to have exactly the opposite effect. The cause of this must necessarily be in the most immediate effects of the surgical act. Possibly the wound has some special relation to the point from which the disease springs. We can easily imagine that the ordinary traumatic irritation may have a different effect when the disease arises from the most anterior part of the sclera or from the ciliary organs. Or, is the cause the escape of the aqueous, causing an

* I am quite willing to admit that a more perfect result (optically, and still more cosmetically) may now and then be gained by greater boldness, by forcible laceration, displacement, or extraction of tough membranes, than in the manner described. Yet I think that such a possibility, when compared with that of causing blindness, will not charm a conscientious operator. In the zonular cataract of adults, we prefer iridectomy, owing to the danger of a cataract operation. Only in very exceptional cases, where, for example, the other eye is perfectly serviceable, and the cosmetic effect seems indispensable, can a more dangerous method be admitted after the risk has been fully explained; according to my experience, extraction by the peripheral linear incision is decidedly the least dangerous.

advance of the lens, tension of the zonula and ciliary organs? After all we must admit a peculiar secretory irritability, which again leads us to the supposition that there is some pre-existent peculiarity in the case.

In operations, much as in injuries, the glaucoma is secondary, and the operation has a direct causal connection with certain intermediate states rather than with the glaucoma itself.

Hereditary Glaucoma.—The older authors fully recognised the importance of inheritance. This influence seems to predominate in typical inflammatory glaucoma,* which often attacks several members of one family and is transmitted from generation to generation. I have noticed that the disease commences in the middle period, or even in the first half of life, after many generations have been already affected. There are some such families in Berlin, in which glaucomatous diseases have already affected three or four generations (possibly more); the first symptoms now usually appear at the age of 30 to 40, whilst the parents and grandparents became diseased at 50 or 60. In some such patients there is an unusually long premonitory stage, which begins at the age of 30 or 40, and continues for 8, 10, even 16 years. I once saw, what is certainly a rarity, glaucoma occur in both mother and daughter in the same year, notwithstanding a difference in age of 26 years. The special form often reappears with all its peculiarities in cases where the disease is secondary. I have already mentioned that glaucoma, presenting a wonderfully congruent course, may follow hereditary sclerectasia posterior; I have noticed a similar combination in cases of dislocation of the lens, and of cornea globosa. On the other hand, the primary state, unfollowed by glaucoma, may also reappear; thus I have seen secondary glaucoma attack only a single member of a family, although in all the brothers and sisters there was congenital displacement of the lens. This is the more intelligible, because in the same individual one eye alone sometimes suffers from the secondary disease. It would be very interesting in respect to glaucoma simplex, to note carefully those forms which show their relationship to it by hereditary co-existence. The simple has appeared to me far less frequently hereditary than the inflammatory form, but my data are too scanty for any decision.

Remarks on the Causation.—The old obscurity still generally conceals the causation of glaucoma, notwithstanding the researches of many recent observers. The occurrence of primary glaucoma only exceptionally at an earlier time than the second half of life, justifies us in some degree in associating its causes with the changes found at that period. But in what does the essential cause consist? In the senile changes of the tissues of the eye (sclera, hyaloidea, &c.), in sclerosis of the arteries, alterations of

* Very possibly the hereditary nature consists here in certain predisposing conditions, such as rigidity of the sclera.

the secretory nerves. All may be supported by particular reasons, but no one is proved by decisive facts. Moreover, secondary glaucoma shows that the process may occur at any age, provided the cause is sufficiently active, but the younger the patient so much the more active or persistent must be the latter. In a word, the (internal?) cause of primary glaucoma is scarcely found to exist, except with the decided tendency caused by advanced age. The predisposition, as is shown again by secondary glaucoma, depends on two circumstances: first, that in the old a given tension causes excavation more rapidly; and, secondly, that the former is itself developed more easily. The greater rapidity with which an excavation is formed is, of course, due to the resistance of the disc decreasing with age, most likely absolutely, certainly relatively to the sclera; further researches on this point are desirable. The more ready increase of tension is very possibly due to the secretory fibres contained in the ciliary nerves being more susceptible to irritation when transmitted through a senile rigid sclera, than when the latter yields as in youth. The same hypothesis would explain the far more frequent occurrence of glaucoma in hyperopic* than in myopic eyes, the sclera, particularly where the ciliary nerves pass through it, being undoubtedly more rigid in the former.

The course of future investigations is indicated to some degree, in that we must expect further light from accurate examinations of the sclera and disc, taking into special account the proportional resistances, and from anatomical and chemical investigations of the ciliary nerves,† comparatively in their extra- and intra-scleral course. It is to be hoped that such investigations will soon be

* I think Laqueur (l. c., p. 44) wrong to doubt this. The hyperopia is no doubt caused by the glaucoma in some cases, yet in others it certainly pre-exists; by comparing the relative frequency, we find that high degrees of hyperopia occur in a given series of cases of glaucoma far more often than on an average in other persons. I can confirm the statement that in cases of glaucoma treated by operation, the hyperopia not unfrequently diminishes, or, if slight, entirely disappears after a time. This may very possibly be always due to the following changes in the lens; the margin of the nucleus is found to reflect very strongly when examined by oblique illumination, whilst the lens is beautifully transparent when the light falls perpendicularly; its focal length is shortened, probably owing to there being a greater difference between the index of refraction of the nucleus and that of the cortex. Such a change is very common in glaucoma and may foretoken the formation of cataract, though by no means necessarily so; it is also found in other cases, in which likewise it may prove to be the first stage of a cataract. This cause of acquired increase of refraction has been hitherto little noticed. It may explain why a slight amount of myopia is really developed in very many cases of commencing cataract; the myopia, again, is in part the cause of misty vision of distant objects, and may also be corrected to some extent by negative glasses for a time.

† Magni's researches (Ann. d'Ocul., xlix, p. 160) cannot, in my opinion, be employed to explain the pathogenesis of glaucoma, as they simply prove *consecutive* atrophy of the ciliary nerves.

published, and that at the same time clinical experience may fortunately lead us to the remote (probably extra-ocular) cause of primary glaucoma.

Connection of the Excavation with the Functional Symptoms.—Since it has been known that in glaucoma the impairment of sight is generally accompanied by a change in the level of the disc, it has been admitted that the interruption of nervous conduction at the edge of the excavation is the solitary cause of the functional disturbance. This principle, though generally correct, requires some modification in particular cases. The increased tension has a complex action on the vision, and occasionally other conditions may exert a greater influence than the excavation. We have already mentioned that in acute glaucoma the vision is impaired *before* there is any distinct excavation; this impairment seems to me to be due to retinal paralysis from ischæmia and probably from imperfect nutrition, (softening?) of the retina. We find, however, in scattered cases of subacute glaucoma also, where occasionally the aqueous becomes uniformly clouded, whilst the eye remains abnormally hard during the intervals (intermittent glaucomatous irido-choroiditis serosa), that the excavation is small relatively to the state of vision, so that we may reasonably ask—are the fibres of the optic nerve bent at the edge of the disc so abruptly as to account for such great (in many directions, indeed, of the field of vision complete interruption) interference with the nervous conduction, or does not the tension modify at the same time the circulation and nutrition of the inner membranes, the latter changes specially originating the functional impairment, and the excavation being only an accompaniment of perhaps subordinate importance. We feel the same doubt in regard to certain cases of secondary and simple glaucoma. For example, I have seen, after reclination and in cornea globosa, great tension followed by gradual blindness, accompanied indeed by excavation, but one bearing no proportion to the functional impairment. I remember, likewise, some very old people in whom the tension was much increased (decidedly glaucomatous), the depth of the anterior chamber and the mobility of the pupil were distinctly diminished, and the vision was destroyed by a periodical loss of sharply bounded portions of the field of vision, and yet the only changes about the disc were a shallow depression and enlargement of the retinal veins. Besides, it is difficult to refer *sharply bounded* peripheral defects with perfect integrity of the adjacent regions and of the central vision, and such are really observed, to an interruption in the nerve-fibres at the edge of the disc. We can understand that fibres passing to the periphery suffer sooner, partly owing to their unfavourable position at the side and edge of the excavation, partly owing to a less power of resistance, than

those ending in more central parts of the retina, but we cannot understand why from a perfectly definite line in the field of vision there should be no conduction, whilst close to the other side of the same line it is normal. Such a state is, of course, exceptional in glaucoma, Se generally diminishing in a gradual manner towards the defect; this condition is sometimes accompanied by other circumstances, which also induce us to doubt the importance of the excavation.

I will here mention a case which is instructive also in other respects. The patient belonged to one of the families affected with hereditary posterior sclerectasia and secondary glaucoma. When he came to me in 1857, the tension was very great, but the excavation of only moderate degree; I was surprised to find notwithstanding, a large, extremely sharply defined defect of the periphery of the field of vision at the nasal side, whilst Se close to it was normal, and S rather greater than 1/1. Even at that time I doubted whether such a defect could be caused by the excavation, and therefore examined most carefully the whole of the fundus, but with a negative result. Iridectomy was performed: the patient is still under observation. Within a year from the time of the operation the outer half of the fundus, exactly corresponding to the contraction of the field, presented a delicately stippled decoloration of the choroidal epithelium, at the same time abnormal pigmentations in the same layer and in the retina itself; these changes increased for a number of years to such a degree that the ophthalmoscopic appearances would have certainly made one think of progressive choroido-retinitis. Yet the field of vision* and the central acuteness of sight remained for eight years exactly in the same state as before the operation. Hence I consider that the affection of the inner membranes must have existed before the operation, though then latent, and that it only became manifest by the ultimate occurrence of pigmentary changes.† It must also be supposed that the defect was not due to the excavation, but to the circumscribed choroido-retinitis, its amount and the normal state of the adjacent Se and of Sc being far more characteristic of that affection than of a moderate excavation. The affection of the internal membranes could not possibly be considered an effect of the interruption of the nerve-fibres, for the latter would affect only the inner retinal layers, whilst here the disease commenced either in the outer retinal or in the inner choroidal layers. Returning to the question previously asked, does the choroiditis latens excite the increased

* Last year, for the first time, the contraction of the field increased, without any change in the central vision; I considered this due to an increase (congestive) of the choroido-retinal process, which was now independent of the original cause (increased tension); proper antiphlogistic treatment proved of use.

† Hence the case is also interesting in respect to the existence of choroiditis latens.

tension, after the manner of a secondary glaucoma, or is it a consequence of the tension? The latter might, *à priori*, be supposed likely to excite such changes, owing to its influence on the arterial circulation, the return of venous blood, and the excretion of nutritive fluids. I myself incline towards the latter view, though unable to give a decided answer, for eight years passed without the least change, after the tension had been reduced to its normal limit. Such could scarcely have been the state if choroido-retinitis had been the primary disease, all the more because the patient used the operated eye alone in his business. This view is supported by the cases mentioned, in which for some time the tension alone was increased; then a sharply-bounded defect, which could hardly be referred to an interruption in the nervous conduction, appeared, and finally an excavation, which sometimes remained of small size.

Peculiar Disease of the Choroid and Retina.—I will here append an account of a case of the same kind, which was anatomically examined by Dr. Leber; it is the only one of which I possess such details.

Andreas K., a journeyman joiner, æt. 52, was admitted on the 14th Feb. 1867, into the eye-department of the Charité. His left eye, now phthisical and free from pain, had been lost three years previously. He says that since that time the vision of his right eye has been weak; the impairment was formerly gradual, during the last four weeks, after an ophthalmia from cold, more rapid. He drinks heavily; the central vision is moderately impaired,—the exact notes unfortunately cannot be found,—so that he can still read ordinary print; peripheral vision at the inner side is very indistinct. The most prominent symptom is torpor retinæ, especially of the part corresponding to the nasal half of the field, so that by lamp-light the peripheral indistinctness changes into a considerable defect, accompanied by a slight general concentrical contraction. The outer parts of the eye present no change except that there is a tendency to pericorneal congestion, especially soon after waking. The pupil is usually of medium size, very sluggish, and dilates imperfectly after the use of mydriatics. The anterior chamber is somewhat shallow, the tension *much and constantly increased*. Hence I quite expected to find excavation of the disc; not only, however, were the disc and vessels normal, but no disease could be found in the fundus (excepting moderate congestion of the retinal veins). A fortnight later he died from delirium tremens.

The following is Dr. Leber's interesting report:—"Form and size of the eye are normal. Venæ vorticosæ are full of blood, not contracted. The eye was removed about 12 hours after death from the body, placed for some days in Müller's fluid, and five days later opened at the equator. Lens and vitreous still tolerably transparent; no disease can be perceived in the anterior half with

the unassisted eye. Moderate post-mortem cloudiness of the retina; the latter presents circular folds around the disc and macula, and others running towards the macula. Large irregular whitish spots in the outer under quadrant of the eye now shine through the clouded retina, especially in the region of the equator; of these no accurate judgment can at present be formed. The tolerably dark epithelial pigment can be wiped off with unusual ease, the subjacent stroma of the choroid presents no macroscopic change. Owing to the ease with which the choroidal epithelium separated at the edge of the section, we did not separate the retina from the choroid, but replaced the eye for a time in Müller's fluid, deferring a complete examination till it had become more thoroughly hard.

It now appeared, that most of the retina readily separated from the choroid as usually, that these membranes, however, adhered somewhat more intimately in the outer half, especially below and at a little distance from the disc, where the white spots had been previously noticed. A thin grey layer presenting a somewhat irregular surface remains on the choroid, after the retina has been carefully removed. This layer varies in thickness, and is at places entirely absent: the corresponding parts of the retina present similar irregularities; where the layer adhering to the choroid is thick, the outer layer of the retina appears to be defective, and *vice versâ*. In fact, it is found on microscopical examination, that portions of the columnar layer of the retina have remained with the choroid, and that consequently the retina appears defective. This thin greyish layer on the inner surface of the choroid consists chiefly of a tolerably soft, somewhat jelly-like fragile substance, which under the microscope appears homogeneous, presenting at the utmost a faintly granular appearance at places. The thickness of this substance, partially uniting the retina and choroid, is everywhere but slight. Microscopically, it has quite the appearance of a fluid effusion between the retina and choroid, that has been coagulated by the use of a solution of chromate of potash.* I have had repeated opportunities of examining various stages of this process of coagulation in diseased eyes, and am convinced that fluid exudations in the interior of the eye, which always contain a large quantity of albuminates, coagulate in a peculiar jelly-like way, by the gradual action of a solution of chromate of potash, especially when the eye is hardened before being opened. The substance keeps most of its transparency, becomes jelly-like, resembling thin coagulated glue, though more easily disintegrated into separate particles by slight pressure. Longer action of the reagent causes a steady increase of the hardness; the translucency, however, persists. Under the microscope it appears homogeneous

* Remark. In a notice of this case ("Sitzungsbericht der ophth. Gesellschaft, Zehender's Monatsblatt, vi, p. 299), this effect is erroneously attributed to carbonate instead of chromate of potash.

or only very delicately and faintly granular. Sometimes lymph-corpuscles, delicate threads of fibrin, &c., are included in it; more often it contains no formed elements. From this agreement of the physical condition and of the appearance under the microscope, it seems to me very probable that we have had here a little fluid effused between the retina and choroid, and that this has become a jelly through the action of the reagent. That it is not due to post-mortem change is shown by similar states being never found in normal eyes treated by chromate of potash, whilst they are very common in cases where enucleation has been performed for threatening or commencing sympathetic disease of the other eye. We find in such eyes, which are usually affected with chronic irido-cyclitis or infiltration of the vitreous, thin layers of a similar jelly-like coagulated matter, between the retina and choroid, or between the latter and the sclera; I have, indeed, often found the contents of the anterior or posterior chamber likewise coagulated, in cases besides, where during life they were certainly fluid in the anterior chamber. Sometimes there were at other places extensive separations of the retina or choroid, and the corresponding fluid was affected in the same way by the reagent. Of course, previous hardening of the eye is in such cases indispensable, for the purpose of proving the existence of very small quantities of fluid exudation; on opening the fresh eye this would be quite impossible, owing to the instant escape and great collapse; it is indeed, decidedly difficult to prove the existence of a large retinal separation by opening a fresh eye. Very small effusions are thus kept in their place by coagulation; the abnormal amount of albuminates, and hence their inflammatory origin,* is proved by the very fact of their coagulating. The negative result of ophthalmoscopic examination in our case proves that during life there was certainly neither a coagulated substance nor any consistent

* I may remark, that peculiar vacuoles, round, elliptical, or elongated in one direction, varying much in size, are observed in such coagulated fluids under the microscope. At first sight they have a very peculiar appearance, and might occasion errors. I conclude that they are due to coagulation, because I once observed similar appearances in a thin layer of coagulated size from one of the larger vessels into which it had been injected. The substance causing coagulation is an alkaline albuminate, for it not only coagulates by boiling, or by nitric acid, but also by acetic acid. Its percentage is often so great, that, after coagulating, the fluid becomes perfectly solid, and the glass can be turned upside down without a drop falling. Acetic acid in excess causes only partial solution, the mass becoming translucent and swollen, and a part also apparently dissolving. Fluid from the vitreous space in cases of synchysis vitrei was affected by chromate of potash exactly like that effused between the membranes, and was, therefore, probably also due to inflammatory exudation. I once examined the fluid from a retinal separation, after the eye had been for a short time only in chromate of potash; it was already coloured yellow, though not coagulated; acetic acid caused firm coagulation. Frerichs long ago showed that there was a large quantity (3·7 per cent.) of soda-albuminate in the fluid vitreous of a dog's eye.

exudation; had anything of the kind existed, the choroid would certainly not have appeared normal, it would at least have seemed in some degree clouded or veiled. It is quite conceivable, that a little serous fluid was effused between the two membranes, yet not enough to displace the retina so far that any change could be perceived in the position of the vessels. The only remaining alternative is that of a post-mortem change; to the objections already made I may add that the parts of the retina concerned presented but very slight post-mortem alterations; even the rods, which are almost always more or less altered in eyes that are not placed immediately after death in the hardening fluid were here in a very good state; the boundary line between their outer and inner portions could be most distinctly seen; the ends alone of the outer portions showed commencing post-mortem change in the form of little bulbous swellings. The elements of the rod-layer were obviously protected and kept in their place by the jelly-like coagulated fluid; the rods generally fell off when we separated the other parts of the retina, so that vertical sections could not be obtained with a perfect columnar layer. Such sections could, however, be admirably effected at the diseased spots, and it was now found that they showed *a very remarkable change of the retina itself*. The rod-layer was not, as usually, immediately applied to the other layers, but was separated from the external granular stratum by various thicknesses of the same substance which covered its outer surface, between it and the choroidal epithelium. This substance had the same characters as that between the choroid and retina; we must, therefore, admit that during life the columnar layer was separated *in toto* over a certain space from the remainder of the retina by a fluid exudation.

The separation not being everywhere equally great, the rod-layer was raised into continuous, closely applied folds. A section, therefore, had a very wave-like appearance, the elevations and depressions being sometimes tolerably steep, sometimes more gradual. The greatest distance of the base of the rods from the outer granular layer was equal to twice the height of the columnar layer itself; the latter at the bottom of the folds sometimes touched the outer granular layer, sometimes was at a very little distance from it. In somewhat coarser specimens, a vertically divided fold of the separated rod-layer was often noticed so rotated, that its two sides (Blätter), instead of being on, were over, or by the side of, one another; thus above the normally placed row of rods, separated by a layer of the exudation so often mentioned, there was a second row, with its elements upside down, so that the outer portions were turned to the outer portions of the other row, as may be seen in Fig. 5, plate 2. Of course this is simply an effect of the section. We notice also pieces of the rod-layer, apparently more or less connected with

the inner layers, in the intermediate space containing the delicately granular coagulated mass; at one point, where a separation was just commencing, the fibre of a bulb seemed yet entire, running through the finely granular matter. There were besides in the intermediate space, some round, delicately granular bodies, without any distinct nucleus; it was doubtful whether these were round cells, or, what seemed more probable to me, separated and altered bulbs. I am the more inclined to take this view, because no analogous elements could be found in the fluid between the choroid and retina.

We have already mentioned, that the bulbs, and especially the rods, were in good condition where separation had taken place. The other layers of the retina showed no change. The *choroidal epithelium* was perfectly normal, the pigmentation everywhere uniform, and tolerably dark; it was unchanged under the coagulated exudation. The *stroma of the choroid* appeared normal to the unaided eye; the microscope, however, showed changes that indicated an inflammatory process. The cells, resembling lymph-corpuscles, in the stratum of small vessels, were decidedly increased in number, and formed here and there small heaps and collections, which became very distinct after the use of carmine, and then could be recognised by the naked eye. The cells of the stroma, both those containing and those without pigment, presented abnormal appearances. Many of them contained two or more nuclei; in the latter case the nuclei were often scattered in various parts of a large cell, and it was then very difficult sometimes to decide whether there was one large cell with two divisions, or two cells connected by a broad extension. Most of the cells were tolerably large and oval; they usually became distinct only after the use of carmine, so that without this means many of them would have been easily overlooked.

These changes make it at least probable, that the fluid between the choroid and retina, and between the layers of the latter, arose from an inflammatory process in the choroid. The history favours this view, the patient having suffered from an ophthalmia, of what kind could not indeed be afterwards determined, four weeks before his admission. A retinal origin must be rejected, as no trace of inflammation could be found in that membrane.

The *optic disc* was normal; there was no *excavation*, but only a little central depression where the vessels emerge. The intra-ocular end of the nerve was found to be quite normal by microscopical examination. There was a partial fatty disintegration of the bundles of nerve-fibres in the orbital portion of the nerve, of which a piece, a few mm. long, had been removed with the eye. The bundles of nerve-fibres were closely studded with small and large fatty granules; the longitudinal striation was thus rendered very indistinct. The greater part, however, of the section did not present this change. The sheath and connective-tissue framework

of the nerve were normal; there were no fatty granular cells. In this respect our case differs from the one recorded by Erismann,* where Eberth found great thickening of the connective-tissue trabeculæ supporting the vessels, atrophy and finely granular disintegration of the nerve-fibres, and granular cells in the atrophied nerve-bundles, whilst in our case there was only the infiltration of the nerve-bundles with fine fatty globules. (Erismann's case was that of a great drunkard, who was nearly blind, fingers to 1′, somewhat pale anæmic disc, field of vision previously normal, could not be examined towards the end.)

Microscopical examination showed in our case no anomaly of the remaining tissues of the eye.

Critical Remarks.—The amblyopia observed during life may, *à priori*, be just as well attributed to the disease of the retina as to that of the optic nerve; the question is, how far did it depend on the one, and how far on the other. The disease of the optic nerve may be justly attributed to chronic poisoning with alcohol, especially if we take into consideration Erismann's case. It very probably caused the moderate impairment of central vision in our case, and its slight degree will quite account for the differences in the anatomical state and the absence of certain changes that were found in Erismann's case. It appeared from the history, that the patient had been suffering for many years from increasing amblyopia, attributable, as already mentioned, to the abuse of spirituous liquors, and anatomically depending on an affection of the optic nerve. We are obliged to come to this conclusion, principally because simple amblyopia potatorum is not attended with any contraction of the field of vision, unless the optic nerve is beginning to atrophy, which was not the case in our patient. The increased amblyopia after the temporary inflammation, with indistinctness of excentrical vision and great torpor retinæ, must undoubtedly be referred to the retinal change, the position of the anomaly in the field of vision (at the inner side) also agreeing with that of the retinal disease (at the outer side). To the objection that in the common amblyopia of drunkards the changes are not so palpable as in this patient, and that the disease of the optic nerve must have been attended by some interference with the field of vision, we must reply that the state of the optic nerve in this disease has hitherto been determined in Erismann's case alone, where towards the end the field could not be examined. The appearance of numerous fat granules in the nerve-bundles does not by itself justify the assumption that the nerve-fibres are completely disintegrated. It is quite conceivable that the axis cylinder may exist and conduct; we find, indeed, at a certain stage of regeneration after section of a nerve, that fibres, which have by no means a perfectly normal appearance, are able to conduct. The

* Erismann, über Intoxicationsamblyopien, Inaug. Diss., Zürich, 1867, p. 54, &c.

indistinctness of excentrical vision must therefore be attributed to the slight separation of the retina and of the columnar layer; the torpor in the affected part of the field quite" agrees with what is found in ordinary cases of separated retina.

What chiefly interested me, whilst the patient was alive, was the continuance of distinct glaucomatous tension, with a corresponding reaction on the pupil, a shallow chamber, and impaired vision, without a trace of excavation. The choroido-retinal process was clearly the cause of at least the great part of the amblyopia, and in respect to its relation to the tension only three suppositions are possible: (1) the two processes were independent of one another, and the functions of the retina were unaffected by the tension; (2) the glaucoma was secondary to the choroido-retinal process, and had not yet re-acted on the disc; (3) the tension was the primary affection, the choroido-retinal process secondary. None of these suppositions can be decidedly contradicted or proved, though in my opinion the last is the most probable. The form of the choroido-retinal lesion is very peculiar, so that on that account we are inclined to assign it to a special cause; a continued increase of tension would serve excellently for such, as it would necessarily impede the venous circulation, and hence cause a tendency to œdema or serous choroidal effusions. It is besides much more likely that the pressure pre-existed, and that the other lesion has but recently occurred, perhaps when the sight became more rapidly worse, because the tension was unusually steady, and such a great degree, apart from glaucomatous inflammation—such was certainly not the recent inflammation, for the vision decreased not *during* it, but after its termination—is usually developed very gradually. However that may be, that increased tension may cause such effusions is rendered probable by this case; we certainly should keep the possibility in view, for in many patients we can scarcely refer the functional state to interrupted nervous communication at the edge of the disc, apart from the fact that the excavation is sometimes very moderate.

Just as from individual anatomical causes, excavation is sometimes produced with great ease, when the tension is relatively little increased and unattended by its usual reaction on the size of the pupil, the depth of the anterior chamber, &c., so also may its formation be impeded by previous organic conditions, and other consequences be first produced in the interior of the eye. Perhaps it will be found by further anatomical researches—necessarily so, if the preceding suppositions are correct—that excavation of the disc is indeed by far the most constant index of a continued increase of tension, yet that in a certain number of cases various changes of the inner membranes, similar to the one described, coexist with it. Lastly, the clinical fact, that lesions of the choroid and retina appear long after iridectomy and point to a previously

latent process, would favour our view, it being supposed that similar cases will occasionally reappear (I can at present add only a solitary case of the kind).

As to the treatment, I have no hesitation in recommending iridectomy, where with decreasing vision the tension proves on palpation to be decidedly increased, though the excavation is not characteristic. In some of the cases already mentioned, of old people, in whom, apart from the form of the excavation, the exquisitely sharp limitation of the defect in the visual field caused me to doubt the interrupted nervous conduction at the edge of the disc, a very satisfactory result, preservation of the *status quo*, or gradual improvement, was obtained from iridectomy, or from the consequent diminution in the tension.

The Operation for Glaucoma.—I shall conclude with some remarks on this subject. I mentioned at the commencement of this essay, that the rule to excise a large piece of iris up to the periphery is not of equal value in all cases. I consider it of great importance for our object, and it has a certain, though limited, relation to the older rule, that the iris should be carefully and completely removed from the wound, *for any inclusion of it in the cicatrix will certainly increase the secretory irritability of the eye.* Had I to choose between a coloboma that does not reach quite to the periphery, but in which the iris is free, and one perfectly peripheral, but in which one edge of the coloboma is largely included in the cicatrix, I should always prefer the former. The more peripheral the internal wound, the greater is the risk of including the iris. That an inaccurately performed operation will generally answer in very acute glaucoma, may be partly owing to the operator fearing in such a case to make a strictly peripheral wound, and thus more easily avoiding adhesion of the iris. It is necessary to make the internal wound sufficiently long, in order that, with a large spontaneous prolapse, the iris may be excised without any excessive traction up to the periphery. I am more and more inclined to advise the operator himself to excise the iris, especially when he is not perfectly accustomed to his assistant. The latter, however skilful, can scarcely apply the convexity of the scissors so exactly to the edges of the wound, or even within the wound itself, as the operator, who, using both hands, feels the tension of the iris. Not only must we take care not to leave a peripheral zone of iris (more than the unavoidable minimum) in the very act of excision—the latter need not, owing to the shortness of the wound, be *à plusieurs temps*, as in the operation for cataract—but we must also remember that one or other edge of the coloboma may be included in the angle of the wound. That this is the case, is shown by the corresponding side of the coloboma being not sufficiently long, and the angle of the sphincter being somewhat approximated to the wound. We must then act just as in the operation for cataract. Re-position

may be effected by stroking the eye with the convexity of the caoutchouc spoon, and the same proceeding will serve to cleanse the wound of any small flakes of pigment. Should there still remain any shortening of one edge of the coloboma, a fold of iris is included in the angle of the wound, and must be excised. If blood in the anterior chamber impedes our view, the lids should be closed and gently compressed with a sponge dipped in iced water; the hæmorrhage will stop in a few minutes, and the blood will escape, at all events sufficiently, if the wound is made to gape and the globe is gently compressed. *In no case should the operation be concluded till we are certain that the iris is completely released from the wound.* The prevention of *posterior* synechiæ, though of secondary importance, should also be attempted. The tendency to their formation may be generally recognized immediately after the operation, by a projection of the angles of the sphincter. When this is the state, I usually let atropine be applied a few times on the day after the operation; in other cases I do not commence with its regular use till the third day (excluding the cases in which the eyes continue excessively tense and threaten a malignant course).

Besides the stricter recognition of these principles, and the more exact indications in the various forms of secondary glaucoma, I consider the diametrically opposite iridectomy an important advance in the treatment. No progress of importance has been made in respect to the *theory* of the operation, notwithstanding many attempts. Old hypotheses are usually dragged forth, little as they avail for the explanation of existing facts. The unhappiest of all, the one referring the effect simply to the wound of the ocular capsule, is periodically brought forward, decked in some new formula, and recommended for adoption. Fortunately for our patients, practice advances independently on the foundation of empirical principles. No doubt, some day a satisfactory theory will be found, but in the meantime we must not be led away by transient hypotheses.

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Part 1.

Original Contributions.

PATHOLOGICAL AND ANATOMICAL RESEARCHES ON THE INFLAMMATORY CHANGES OCCURRING IN THE INTRA-OCULAR TERMINATIONS OF THE OPTIC NERVES AS A CONSEQUENCE OF CEREBRAL DISEASE.

By Dr. Hermann Pagenstecher (of Wiesbaden).

The following pages contain the results of a series of investigations which were for the most part made during my residence in London in the winter of 1869–70, when I had the opportunity offered me of carrying them on in the laboratory of Dr. Bader. I was the more inclined to accept the offer he made, that I should especially study the pathological anatomy of optic neuritis, because Dr. Hughlings Jackson at the same time very kindly placed at my disposal his valuable and extensive material; and I thus had the opportunity of examining with the ophthalmoscope a great number of cases coming within this category, and of learning at the same time the views of a colleague so distinguished in this branch of ophthalmology. I obtained some of the materials for my re-

searches through the kindness of Dr. Bader (Cases I, IV, V, and VII), whilst for some I am indebted to the goodness of Dr. Hughlings Jackson (Cases II and VI), and of Dr. Andrew (Case III). I must not omit to render my best thanks to these gentlemen, and especially to Dr. Bader, for frequent assistance in carrying out this work. As regards the clinical notes, it must be confessed that in some of the cases they are not so complete as I could desire. The very chronic course of the morbid processes, and the wanderings of the patients from place to place, will easily explain this. However, they are sufficiently complete to serve as an introduction to the pathological anatomy of the preparations.

Case I.

Thomas A., æt. 43, admitted into Phillip Ward, Guy's Hospital, under Dr. Rees, December 1st, 1869.

History.—He says he was quite well till 18 months ago, when he first experienced an odd feeling in his head and chest, "his heart seeming to rise into his mouth," followed quickly by a slight faintness or loss of consciousness.

From the first these attacks came on twice or three times daily, but they soon increased in frequency; he was, however, enabled to continue his work. Seven or eight weeks ago the character of the symptoms changed, he woke up one morning with severe pain in the head, which increased for a day or two, and was then followed by the shooting pain, of which he now complains. He has had at times retching and nausea, but not actual vomiting. Bowels regular. Vision sometimes deficient. Hearing good.

P.S. He has severe shooting pains now in one part, now in another part of the head; he has had scarcely any sleep for the last eight weeks; he complains of nothing else, but has constantly an anxious expression of countenance due to the cephalalgia. On inquiring about venereal disease, he owns to a sore on the penis, but denies having had eruption or sore throat. The inguinal glands are a little enlarged and indurated, but chiefly those below Poupart's ligament.

Ophthalmoscopic Examination. — Both optic discs — extreme hyperæmia, with venous hyperæmia of the retina; arteries small.

December 15.—Optic discs seem covered almost entirely by irregular whitish patches, which project a short way along the larger retinal vessels.

December 22.—Has complained of head-pain throughout; is getting very much weaker, perhaps more so on the left side. Right side of the face appears to be drawn up. Has spoken little—is roused to take food.

December 23.—Died.

From Dr. Moxon's Report of the post-mortem Examination.— "Cranial bones remarkably thin and diaphanous. Dura mater natural. Proper membranes dry on surface from swelling of the brain; no lymph anywhere.

"A large tumour was in the right middle lobe at its anterior end and lower surface, so that in the middle fossa it was adherent; the surface was torn in removal. It swelled greatly this part of the brain and pushed the other parts aside; lengthened and pushed to the left the infundibulum; flattened the optic tract and peduncle; pushed up and covered corpora albicantia and parts about the floor of the third ventricle; flattened the right third nerve to $1\frac{1}{2}$ width of the left; thrust back the right side of the pons so that here the pons measured $\frac{6}{8}$ in., but its left side measured $\frac{9}{8}$ antero-posteriorly; pressed on the third root of the olfactory nerve and on the under part of its commissure, so that these were thrown to a right angle with the rest of the course of the olfactory commissure. It was not adherent to any other part than that stated, and there were no signs of inflammation around it. The adhesions appeared due to pressure and implication in the outskirts of the growth. Section showed the disease to consist of a large irregular mass, like in appearance to clotted blood in various stages of transformation. Thus a piece of the size of a walnut was blackish brown and reddish brown, the colours variously mingled. In the black patches the appearance was quite of recent clot. Other parts near the greatest patch were of yellow colour and almost cheesy appearance, but moister, fleshier than ordinary cheesy gummata, more like yellow clot. Around all the tumour (which was as great as an orange) was a brightly injected vascular zone, in which some veins were very

large and tortuous. This zone, generally ½ in. wide, was ductile and juicy, but not very lacerable. Outside it was an indeterminate area, say 2 in. on the average, of yellow softening."

Anatomical Examination of both Eyes.

The posterior half of each eye, with its optic nerve, was given me for examination. There was nothing abnormal externally in either of the globes. The length of the right optic nerve was 2·5 cm. (about 1 inch), and that of the left 3 cm. (1⅕ inch nearly). The size, colour, and consistence of both nerves appeared perfectly normal all through their course. Only where they pierced the globe the sheath appeared slightly wrinkled. Transverse and longitudinal sections through various parts of both optic nerves exhibit everywhere a perfectly normal arrangement of the nervous and connective-tissue elements. Teased-out preparations also displayed completely normal nerve-fibres. Treated with chloride of gold, and by carmine-tinting, the reactions were just as normal.

Right Eye.—The optic disc and its immediate neighbourhood appear prominent, and the retina has here an uneven, irregular, and somewhat rough appearance. Sections through the peripheral part of the optic nerve, optic disc and retina, show that the distance of the highest point of the retina from the lamina cribrosa is 2 mm. (·079 inch), and the thickness of the retina, measured from the commencement of the choroid measures 1·2 mm. (·047 inch). The swelling extends itself to a distance of about 2 mm. (·079 inch) from the beginning of the choroid, around the optic entrance, and then somewhat suddenly and steeply declines to the normal thickness. The diameter of the intra-ocular termination of the optic nerve (optic disc) amounts to 1·6 mm. (·063 inch) at the level of the choroid. Closer examination shows that the swelling in the region of the disc and the contiguous parts of the retina is caused by a thickening of the layers of nervous tissue (nerve-fibres). As this somewhat mushroom-like swelling ex-

tends itself all round, the remaining layers of the retina are pushed somewhat towards the periphery, so that they cannot well be measured till about from 0·3 to 0·5 mm. (·012—·019 inch) from the beginning of the choroid (Fig. I). This swelling is almost entirely caused by degeneration of the nerve-fibres. The several fibres are indeed very considerably thickened, their contours are very evident, with varicose swellings (beaded), and they have dark, finely-granular contents. This thickening extends partially over a considerable length of the nerve-fibres (Fig. III), whilst in some parts it is interrupted by thinner portions. On account of the latter circumstance we occasionally get beautiful figures of somewhat spindle-shaped, and pearl-necklace like fibres (Fig. II). If these are not isolated, they give to the whole of the layer, or at least to the part in which they are most abundant, an appearance as if the tissue were interspersed with finely granular cells. This occurs most commonly in the middle part of sections which do not traverse the longest diameter of the optic disc. It is particularly here that transverse sections of the thickened nerve-tubes, and especially of their dilated portions, give to the tissue the appearance of being rich in cells; yet undoubtedly their varying size, their want of nuclei, as well as what we learn from teased-out preparations, guard us from making such a mistake. These changes can be demonstrated in all the layers of thickened nerve-fibres, but they are most strikingly evident towards the interior, and in parts lying just above the commencement of the choroid. In some parts we find there are nests of large, usually yellow-tinted, spheroidal figures, which generally resemble cells, and sometimes a round nucleolar figure is discoverable in their interior. However, when they are isolated, they are found to be provided with one, or very often two, frequently very thick continuations, or tail-like processes (Fig. IV). Their contents, which usually look homogeneous, when examined with a low power, appear finely granular when explored

with No. 9 of Hartnack's immersion lenses. These nests are the white patches, or "plaques" which are seen so vividly with the ophthalmoscope. They chiefly implicate the innermost layers of the nerve-fibres which are nearest to the vitreous, but in some spots they can be traced as far as the choroid. The changes mentioned above by no means affect all the nerve-fibres, for in all the preparations a great number of very fine fibres can be demonstrated, which entirely correspond in appearance and behaviour to those nerve-fibres which we usually see in normal preparations. Numerous small vessels traverse the whole region of the swelling. No increase of the interstitial connective tissue, or of connective-tissue cells, and no heaping up of lymphoid corpuscles could be demonstrated anywhere. Only in the intra-ocular termination of the optic nerve (optic disc), in the immediate vicinity of the larger vessels, a few granular, round cells with evident nuclei were visible. In the same region the calibre of the vessels is diminished, whilst simultaneously, both posteriorly in the optic nerve itself, and anteriorly in the optic disc, there are slight funnel-shaped dilatations in the vessels. The exterior and interior sheath, as well as the intervening connective-tissue, do not exhibit any abnormality, even in the immediate neighbourhood of the bulb.

The choroid, and the remaining parts of the globe are normal.

In the *left eye*, with the exception of quite immaterial differences, an exactly similar state of things could be demonstrated.

Case II.

The notes of this case were taken by Mr. G. Ernest Hermann.

Isaac K., age 55, admitted under the care of Dr. Hughlings Jackson, November 22, 1869.

Has never been laid up before. Has been in the habit of taking spirits freely. A person who came with him said that last evening he had a fit, which lasted about three-quarters of an hour, during which he foamed at the mouth, and "worked" his

left arm and leg and left side of face. [It was afterwards ascertained that he had had pain in the head for six months, and that a day or two before he had had a fit at work, and that afterwards his leg "dragged."] The patient stated that he fell down in a fit about five o'clock, and knew nothing till he found himself in the hospital.

On admission there was no paralysis of any ocular muscle. Either eyeball might be rubbed without inducing contraction of orbicularis, or apparent uneasiness. Face slightly drawn to left. When told to screw up his eyes, he screws up the left more tightly than the right. When told to elevate the eyebrows, the left is more elevated than the right. Tongue protruded to right. Paralysis of the right arm, with a disposition to rigidity. Can move right leg a little; left arm and leg readily. Action of intercostals cannot be watched, as patient is very fat. Epigastrium sinks in, and abdominal walls fall outwards at beginning of inspiration. Costal angle very obtuse. Respirations, 24 per minute, chiefly thoracic. Temperature, 100° F. Cardiac dulness extends above to third rib, on the right to midsternum on the left to nipple. Apex beat cannot be felt; no murmur. Arteries hard and cordlike. No arcus senilis. Passes urine and fæces in bed; urine contains no albumen.

November 23.—No movement in right arm; no rigidity. Face more drawn; tongue more protruded to left, covered with white creamy fur. Epigastrium does not sink in inspiration so markedly as last night. Seems partially unconscious; speaks thickly; seems to take a long time apprehending questions, but answers rationally. He has not much movement in right leg, but says he can move it better than last night. Urine, sp. gr. 1024, acid; no albumen, lithates. Temperature, 100°.

November 24.—Can move leg a little, but not hand. Epigastric movement much the same. Head inclined to right; eyes not inclined any particular way.

November 26.—Can move right arm but slightly to-night, which he could not do before. Tongue covered with creamy fur. Breathes noisily, but without stertor. Epigastric sinking not so marked. Talks slowly and thickly, and apparently with effort, but sensibly. Temperature in left axilla, exposed, 97°. Pulse, 38. Respirations, 26.

November 27.—General condition about the same. For the

first time the ophthalmoscope was used by Dr. Hughlings Jackson. The left eye was normal. The right disc was not defined, the redness of the fundus seeming to extend to the very entrance of the vessels; the veins large and slightly tortuous. There were no effusions of blood.

December 9.—There were now seen linear smears of blood parallel with veins about the position of the edge of the disc, which was not visible. In the position of the disc were several irregular white patches. One large vein seemed for a short distance to be enveloped in blood—as it were turned into a short column of blood. The left disc was still normal. The left sixth nerve was paralysed, this having come on since last note.

The patient remained in the same condition as regards the paralysis until his death on January 14th, 1870. Nothing abnormal was discovered in the fundus of the left eye. He became gradually more and more comatose. His temperature was taken daily by Mr. Hermann, but was never higher than 99°, except on January 13th and 14th. It was sometimes as low as 97°, and on one occasion Mr. Hermann found it to be 94°. On January 13th, it was 100·9°, and on the 14th, five hours before death, it was 104·4°. Two hours *after* death it was 101·7°.

Autopsy. January 15, 1870.—There was an undue amount of subcutaneous fat, and the cellular tissue over the pericardium was beset with it. The heart was small. Its right cavities contained fluid blood in which no trace of clotting was discovered. In the left side was a trifling quantity of blood. There was fatty accumulation about the heart. Except for atheroma of the valves, the heart was normal. There were a few trifling adhesions of the pleura on the right side, but no fluid in either of the pleural cavities. Both lungs were anteriorly very emphysematous. The dependent part of the *right* lung was slaty black, non-crepitant, except at its margins, and pieces of it sank in water. It was not firm nor unduly soft. There were no patches, the coloration being uniform. The emphysematous parts were, in section, pale.

The left lung was more bulky, not obviously collapsed in any part, and its section was studded by black, well margined patches of varying size from that of a sixpence to that of a shilling—two or three being on the surface. There was scarcely any nodulation to be felt in handling the lung. This lung, except its emphysematous part, was very easily broken down by pressure.

The liver was of a dark colour. The large veins exuded much blood on pressure.

The spleen was flaccid, and weighed seven and a-half ounces.

The kidneys were healthy.

In the left hemisphere there was a large gliomatous tumour, which involved the hinder part of the corpus striatum and part of the optic thalamus, and extended at one point close to the grey matter of the convolutions of the upper margin of the Sylvian fissure. The peripheral parts of the tumour were bluish black in colour, and were not marked off from the rest of the brain. The section of the central part of the tumour was of a pale yellow colour, marked here and there by redder parts.

The specimen was required for the museum, and thus no further examination was attempted. Subsequently, however, it was decided not to preserve it, and further examination of it was made when it had been some time in spirit. It was then seen that the mass lay chiefly betwixt the corpus striatum and thalamus and the convolutions, and involved very little of these parts of the motor tract. There was, however, much softening of the lower part of them, but whether this was pathological or owing to decomposition, was not ascertained. The rest of the brain was normal.

Nothing was found to account for the paralysis of the left sixth nerve. It was traced in its course to the orbit by Mr. MacCarthy.

Dissection of the two Eyes.

The posterior halves, with the optic nerves attached, were reserved for examination. Both globes appear of normal size and shape. The left optic nerve is 2·8 cm. (1·1 inch), and the right 3 cm. (1·2 inch) in length. Close inspection of the optic nerves revealed the following changes. The right, in its whole length, appears thicker than the left. Its thickness increases steadily towards the globe at its central end; that of the right optic nerve amounts to 5 mm. (0·197 inch), and that of the left to only 4 mm. (0·158 inch), across their longest diameter. Close to the eye the thickness of the right optic amounts to 8 mm. (0·32 inch), whilst the left is only 5 mm. (0·197 inch). In cross sections at the peripheral end it appears that the thick-

ening principally depends upon an increased volume of the outer and inner sheaths. At a distance of about 1·5 cm. ($\frac{6}{10}$ inch nearly), and up to the eye itself, this considerable thickening is chiefly caused by an irregular bulging dilatation of the external sheath. Transverse sections in this region show that the optic nerve itself, which has here a thickness of about 4 mm. (·158 inch), is connected with the walls of the external sheath only by a small quantity of fine, spongy (locker) areolar tissue, so that a hollow space is formed around the nerves by the dilated sheath (Fig. V). This hollow space diminishes in extent posteriorly towards the centre, and is completely lost at a distance of about 1·5 cm. ($\frac{6}{10}$ inch nearly) from the eye, so that the nerve itself is pretty closely invested at this part by the sheath. A transverse section through the optic nerve of the other (left) eye shows the sheath everywhere closely investing the nerve.

As regards their size, colour, and consistence, the nerves themselves, both at their peripheral and central ends, exhibit no macroscopic (naked-eye) deviations from the normal. On a closer examination of the optic entrance and of the retina of the right side, we find as follows :— From the point where the vessels enter, which is marked by a slight depression, a slight annular swelling comes into view, which extends, with gradually diminishing intensity, somewhat over the margins of the disc. The retina, which is here, as indeed everywhere, tinged yellow by chromic acid, exhibits a rough and somewhat dull appearance, and in this region numerous small punctiform spots of more lustrous appearance show themselves, with a few reddish streaks. The vessels cannot be traced from the periphery to their entrance, their calibre is considerable, yet no decided tortuosity can be demonstrated. Thin transverse sections through the central ends of the optic nerves of either side exhibit nothing abnormal, even at a distance of 5 mm. (·197 inch) from their entry into the eye. Preparations made by teasing allow well-developed

nerve fibres to be clearly recognized. The connective tissue between the different nerve bundles appears unaltered, only on the right side it frequently gives the impression as if in many spots it was interspersed with more nuclei than on the left side. Transverse sections through the optic nerve and its sheath, through the choroid and the retina, give the following results:— Whilst on the left side the external sheath closely invests the optic nerve, it is clearly separated from it on the right side by a loose tissue. The latter increases in thickness (density) towards the optic entrance. The proper intraocular portion of the optic nerve appears on the right side somewhat tapering, so that a transverse section at the level of the choroid only amounts to 1·8 mm. (·09 inch), whilst that of the left eye equals 2 mm. (·079 inch). The optic disc itself, and the adjacent part of the retina, are very prominent. (Fig. V.) The distance of the highest point of this from the lamina cribrosa is 1·75 mm. (·069 inch) on the right side, whilst in the left eye it is a little more than 1 mm. (·039 inch). The thickness of the retina above the commencement of the choroid also amounts to 1 mm. (·039 inch). The prominence slopes gently towards the periphery, so that at a distance of 5—6 mm. (·19—·20 inch) from the entrance of the vessels it is almost invisible. Thin transverse sections of the left side show nothing abnormal. We learn from a microscopic examination that the swelling of the right side is chiefly due to a thickening of the nerve fibres, with occasional occurrence of varicose dilatations. The contents of these are finely granular. Along with these there is a moderate number of free nuclei, which are most numerous in the very centre of the disc. The dilatations of the fibres (nerve-tubes) generally give the appearance of nuclei, and these give one the impression that a free nucleus is attached to the fibre. But when the object is isolated, and a rolling movement communicated to it by pressure on the covering-glass, we can easily convince ourselves as

to their true nature (Fig. VI). Besides the changes just described, the swelling was also due partly to the dead white patches (plaques) seen by the ophthalmoscope. They are made up by an accumulation of very large, and generally spherical figures, which often have two tails or processes (Ausläufer). By teasing out, these can be isolated, and sometimes so perfectly that they give the impression of being independent cells, with a nucleus in each; we learn, however, from other parts, that they are connected with thickened nerve-fibres, and that they must therefore be considered as a sort of ganglion-cell degeneration of the nerve-fibre (Fig. IV). They are chiefly found in the inner portion of the nervous layers, but occur also in the region of the disc in the deeper layers, and even sometimes a little below the level of the choroid. Along with this degeneration the tissue is also found interspersed with numerous extravasations of blood, which are chiefly found in the internal layers of the nerve-fibres. The remaining layers of the retina are somewhat extended from their normal point of origin, and take their origin at some distance from the scleral confines. In all other respects they are clearly distinguishable, and exhibit no particular deviation from the normal. Numerous capillary blood-vessels traverse the discs and their immediate neighbourhood. Down to the lamina cribrosa no alteration in regard to thickness or disposition of the normal connective tissue fibres, or of their contained nuclei is demonstrable. The connective-tissue of the internal and external sheath in the neighbourhood of the globe is much thickened, and arranged in coarse bundles, with wide meshes. The internal sheath appears unaffected, whilst, on the other hand, directly beneath the lamina cribrosa, and from thence to a distance of about 2 mm. (·079 inch) towards the centre, the interstitial connective-tissue which is met with is interspersed with numerous small round or oval finely granular nuclei. The retina at some distance from the disc, as well as the whole of the choroid, appears normal.

In the left eye no morbid changes could be demonstrated in any part.

Case III.

John D., æt. 39. Accurate clinical notes of this case are unfortunately wanting. On the 29th January, 1870, I had the opportunity of examining this patient with the ophthalmoscope whilst he laid comatose, with complete hemiplegia of the left side. Both optic discs were greyish-red in colour, moderately swollen, and their margins muddy and indistinct. Here and there the vessels on their margins appeared tortuous. On the whole the retinæ showed pretty considerable venous congestion, whilst the arteries seemed relatively small. There was no striking tortuosity of vessels demonstrable. A further examination on the 5th February, 1870, showed that the swelling of the discs was somewhat diminished, and their scleral borders were now visible, though rather indistinctly. The vessels were as before.

The post-mortem on the 8th of February, 1870, showed flattening of the convolutions, muddy opacity of the pia-mater, and in the middle of the right cerebral hemisphere there was a centre of softening (Erweichungsheerd) about the size of a small apple, containing a small tumour ($\frac{1}{3}$rd of an inch in diameter), which sprang from the dura-mater, and extended into the middle lobe of the right hemisphere of the brain. The optic nerves, where they entered the optic foramina, were of normal white colour, and their sheaths did not appear at all dilated. There was also carcinoma of the right lung. Only the posterior half of the right eye was removed for examination.

Anatomical Examination of the Right Eye.

2·5 cm. (1 inch nearly) of the optic nerve had been preserved. The central end was normal as regards size, colour, and consistence. Directly behind the globe it began to be thickened, which at a short distance from the eye amounted to from 6—7 mm. (·20—·27 inch). It showed fluctuation clearly, and on section exuded a turbid fluid, which contained a great number of round, granular cells, very evidently nucleated, and also free nuclei.

Transverse sections showed plainly that the thickening was due to a dilatation of the outer sheath. The latter was attached to the inner nerve sheath by wide-meshed connective-tissue. The limits of the intra-ocular termination of the optic nerve (optic disc) could be clearly recognized, as well as the vascular twigs proceeding from it, after the removal from the corpse.

Transverse sections of the hardened preparation showed a somewhat deep physiological excavation in the centre of the disc. The retina in its vicinity was thickened. Above the commencement of the choroid the retina measured 0·66 mm. (·026 inch). The distance of the highest point of the same from the lamina cribrosa was 1·33 mm. (·053 inch). The diameter of the optic nerve at the level of the choroid was 2·15 mm. (·085 inch).

Thin transverse sections through the central end of the optic nerve did not exhibit any microscopic changes. The arrangement of the nervous and connective tissue elements was quite normal. Teased-out preparations showed well-formed nerve fibres. The chloride of gold and carmine reactions were also quite normal. Near the eye, where the above-mentioned dilatation of the sheath occurred, the tissue of both sheaths was somewhat looser, and the intermediate connective-tissue a little increased and thickened. At the same time a considerable number of delicate round granular cells were found. Microscopic examination of the retina, and of the intra-ocular termination of the optic nerve showed a swelling of the tissue of the optic nerve-fibres, so that this was elevated above the plane of the choroid in a somewhat mushroom-like manner. The remaining layers of the retina were, therefore, somewhat pushed out of place, and took their origin at a distance of about 0·45 mm. (·017 inch) from the commencement of the choroid. The thickening of the layers of nerve-fibres extends a little more than 0·75 mm. (·029 inch), and from this point declines somewhat abruptly to the normal thickness. The physiological excavation is deep,

and abruptly margined. The central vessels were evidently compressed in the scleral plane, and began to dilate from this point on both sides in a somewhat funnel-shaped manner. In the spot where the layers of nerve fibres were thickened, there were found a moderate quantity of evidently swollen nerve-fibres, some of which were spindle-shaped, whilst others showed a manifest thickening in their whole length, with finely granular contents (Fig. VII). Amongst the latter one saw in many spots their contours irregularly broken. The same tissue was found interspersed with round or oval, finely granular elements of varying size, which were most numerous in the zone of nervous-fibre layers situated most internally, and indeed chiefly in those sections which were not made through the longest diameter of the disc. A closer examination shows that the nuclear appearance of these sections was due partly to the presence of free nuclei, and partly to the cutting across and dilatation of the nerve-fibres themselves (Figs. VII and VIII). Indeed these dilatations generally gave one the impression that they contained a finely granular nucleus. This was, however, brought about by the above-described unequal bulging-out of the nerve-fibres themselves. Their behaviour can very easily be studied in isolated fibres, if one makes them revolve slightly by gentle pressure on the covering-glass, and they are thus made to present themselves in various positions. Accompanying these degenerated nerve-fibres there were, however, a great number of well-formed ones. The vessels in the region of the disc were very numerous. No increase of the connective-tissue could be demonstrated in the region of the disc, whilst on the other hand, in the vicinity of the lamina cribrosa, the nerve-bundles were surrounded with somewhat coarser and more abundant tissue. The rest of the retina, and the whole of the choroid, were normal.

Case IV.

February 12, 1868.—Mary Jane P., æt. 20. Parents both

healthy; has been employed for the last four years as a nurse-maid. Up to 12 months back has been always well and active. About 6 months ago, when in service and staying at the sea-side, she was attacked, after bathing in the sea, with shivering and illness, and suffered from what she called neuralgia. She had an attack of jaundice, but of very mild form, and from that time to the present the menses have been suppressed. She has been gradually getting weaker, but has not lost power in any particular limb; has had no sickness or fits.

About 3 months ago the eyes first began to be affected. It commenced by indistinct vision, which was at first noticed in the left eye. She says that the flame of a candle was murky and hazy, and that in the children's copies one line became confused with another. She had very little sleep, pains in the temple, and complained more during the last 3 months of giddiness. Seven weeks ago she was so bad as to be obliged to leave her place, during which time there have been, she says, temporary improvements in vision, which were simultaneous with the relief of the cerebral symptoms, but were only of short duration.

Ophthalmoscopic examination.—Slight hypermetropia, optic disc swollen, whitish and ill-defined; arteries scarcely visible, veins few in number and thin in optic disc and retina. Same state in both eyes. Patient was then removed from the ward and died 5 weeks afterwards. The post-mortem examination took place in the house of the patient.

Notes obtained from Mr. Hallam.—Brain convolutions flattened; at the inner side of the right posterior lobe of the cerebrum was a cauliflower-like growth, resembling brain matter covered with bosses (glioma). Base formed by right half of cerebellum and optic thalamus and part of white matter of posterior lobe of cerebrum. Tumour pressed forwards into the right ventricle, pressing its walls into close apposition. Tumour pyramidal in shape $2\frac{3}{4}$ inches at base, $2\frac{1}{4}$ inches high.

Anatomical Examination of the Two Eyes, with their Optic Nerves.

The left eye was entire, with 3·5 cm. (1·379 inch) of the optic nerve; whilst one-half of the right globe, with

3 cm. (1·18 inch) of its optic nerve, was sent me for examination.

At a distance of 2·5 cm. (1 inch nearly) from the globe, the longest diameter of both nerves was 5 mm. (·196 inch). This decreased somewhat on both sides towards the eye, so that at a distance of 1·5 cm. ($\frac{6}{10}$ inch nearly), it only amounted to 4·5 mm. (·177 inch). At this point again, on both sides, a considerable thickening commenced, which gave both nerves before their entrance into the globes a sort of fungiform appearance. The longest diameter, at a distance of 3·5 mm. (·138) inch from the right eye, equals 6·6 mm. ($\frac{1}{4}$ inch nearly), of this 3·5 mm. (·138 inch) belongs to the optic nerve itself, whilst the rest is made up by the sheath, and a loose, intervening connective-tissue. Transverse sections, through the central ends of both optic nerves, show the nerves themselves to be perfectly normal as regards their delicate structural conditions. Well-marked nerve fibres could be easily demonstrated by teasing with needles, and although chloride of gold and carmine reactions did not show their accustomed beauty in preparations which had been so long preserved, yet they reacted sufficiently to convince me that the fibres were perfectly normal. At the spot where the nerve-sheath began to be dilated, the inter-vaginal connective tissue is slightly increased, and the separate fibres are somewhat crowded together. This was more marked towards the globe, and attained its greatest development in the thickest part of the optic nerve. Numerous, finely granular, rounded cells were also met with amongst the meshes of the fibres of connective-tissue, along with a delicately nucleated coagular material. Both the sheaths, internal and external, exhibit thickening, and at the same time their tissue is looser.

In the left optic nerve itself there are a large number of interstitial nuclei, at the same time the connective-tissue in some parts, especially in the vicinity of the vessels, is increased, and interspersed with numerous round

and spindle-shaped cells. These changes, which begin at a distance of about 3 mm. (·12 inch) from the globe, occur also, especially in the course of the vessels, in the intra-ocular termination of the optic nerve (optic disc) and in the retina itself. The distance of the highest point of the optic disc from the lamina cribrosa amounts to 1·4 mm. (·055 inch). In the disc itself, at the point where the vessels emerge, there is a very evident (mächtige helle) increase of the connective tissue, which is interspersed with numerous nuclei. The rest of the intra-ocular portion of the optic nerve (optic disc), from the lamina cribrosa, was chiefly composed of a network, consisting of fibres, of varying thickness, in which, along with occasionally granular contents, there occurred numerous rounded or oval nuclei. These were usually the size of a red blood corpuscle, but were often indeed as large as a colourless blood-corpuscle. They were very evenly distributed all over this reticular tissue, and were in the vicinity of the vessels, where indeed the great increase of connective-tissue was much less evident. Teased-out preparations in this region show that a considerable number of evidently hypertrophied nerve-fibres were demonstrable amongst the normally developed ones. This thickening sometimes involved a considerable length of the fibres; sometimes the dilatations were varicose (beaded) or club-like. These fibres had finely granular contents. Their contours in many parts were indistinct and broken, and the dilatations of the fibres very frequently gave one the impression of having a very distinct nucleus within them (Fig. VIII). If, however, the fibre was observed whilst in movement, especially in rotation around its long axis, it was easy to convince one's self that this was simply due to a swollen portion, which, in a certain position, simulated a nucleus. The layer of nerve-fibres in the vicinity of the disc is just as evidently affected, being principally composed of a rather loose-meshed tissue, with delicate fibres running longitudinally. The meshes are also arranged longitudi-

nally, and contain numerous, finely granular cells, with free nuclei. These occur also in the ganglion-cell layer, along with some degenerated ganglion-cells. The thickness of the layers, which in the region of the optic sheath, on account of the numerous vessels, and the surrounding increase of connective-tissue, amounts to nearly 1 mm. (·0394 inch), speedily diminishes considerably, till it equals only the thickness of 0·05 mm. (·002 inch). The choroid also appears implicated in this process, at least its tissue shows an evident decrease of pigment cells, and in consequence of this a considerable number of rounded cells, which extend all through this membrane, in the neighbourhood of the disc. In the layer of the sclerotic nearest the choroid, cells, evidently containing pigment, were easily demonstrated, as well as diffused pigment. Both eyes were affected in a similar manner.

Case V.

Miss H——, æt. 48.

This case is extremely interesting, because failing sight was the first symptom which indicated any disease at all. Dr. Bader, who was consulted for this two years before, was able to recognize on both sides well-marked optic neuritis (Stauungs papillæ, hyperæmia of the discs). He had the patient under observation for some months, and during the whole of this time there was no other symptom at all to indicate cerebral disease. These symptoms did not supervene till a later date, when they announced themselves by paralytic phenomena, which involved all the left side of the face and the left half of the body. Dr. Bader procured me the opportunity of examining this patient with the ophthalmoscope sixteen days before she died, with the following result :—" Both discs appear somewhat swollen, of greyish-white colour, with a very slight tinge of red ; their borders are rather indistinct, and some shiny streaks, parallel with some of the vessels, can be seen near the margins of the disc. The veins are well marked ; the arteries, on the contrary, are somewhat small." No particular tortuosity of vessels was discovered. The amaurosis was complete.

Death occurred on the 26th April, 1870. The post-mortem examination took place 18 hours after, and I was allowed to examine the brain.

On removing the calvaria, nothing abnormal was evident, except great congestion of the convex surface of the brain: the sinuses were moderately congested. At the base of the brain there was found a tumour the size of a hen's egg, with well-marked fluctuation. It lay in the situation of the anterior inferior lobe of the left cerebellum, by the side of the medulla oblongata, and pushed the left crus cerebelli upwards, against the pons varolii, and displaced the posterior lobe of the cerebellum in an upward direction. The tumour consisted of two portions; the posterior and firmer part was of the same consistence as the cerebellum, and was irregularly nodulated in parts; the anterior and smaller fluctuated most markedly, and had smooth thin walls. The tumour was very easily detached, and the whole cerebellum was seen to be well developed, but somewhat pushed out of place, and the surface of the medulla oblongata also showed a depression on left side. The 5th (Trigeminus) nerve, considerably elongated and flattened, wound round the outer side of the tumour. The tumour was connected with the directly superincumbent parts by a very easily lacerable tissue; its lower surface was partially so, corresponding to a corroded, rough, and irregular bony surface. The long diameter was 6 cm. (about $2\frac{1}{3}$ inches), and its greatest width 4·7 cm. ($1\frac{9}{10}$ inch nearly), whilst its depth was 3 cm. ($1\frac{1}{5}$ inch, nearly). Through the displacement of the left lower lobe of the cerebellum, the crus cerebelli ad pontem of that side appeared considerably elongated. When the tumour was cut into, there appeared in the anterior part a smooth-walled cyst, 2·4 cm. ($1\frac{2}{3}$ inch, nearly) in length, and 2 cm. (about $\frac{3}{4}$ inch) broad, full of a clear fluid. A similar, but smaller one, existed posteriorly. The cut surface of the tumour itself exhibits a very mottled appearance; yellowish-white, or transparent-grey, and reddish spots mingled together. The whitish parts seemed to be of firmer consistence than the transparent ones. The addition of acetic acid produced no macroscopic changes. Except a slight dilatation of all the ventricles, no other abnormality was met with in the brain.

The microscopic examination of the tumour showed a spindle-celled sarcoma, which had undergone partial fatty degeneration.

Anatomical examination of the Eyes with their Optic Nerves.

Both globes were preserved entire, in spirit. As regards their size and shape, nothing abnormal was remarked. The right optic nerve had been cut off at a length of 1 cm. (·39371 inch = $\frac{4}{10}$th inch nearly), and the left was 1·2 cm. (·473 inch = $\frac{1}{2}$ inch nearly) in length. The nerves themselves are very thin (longest diameter = 2·8 mm. = ·11 inch) and of a pale, greyish-red colour; in both the external sheath is very much dilated and thinned, so that it hangs about the nerve like a loose sac (Fig. IX). Between the outer and inner sheaths, a tolerably thick and regular soft connective-tissue is met with. The circumference of the outer sheath amounts to 1·5—1·7 cm. ($\frac{6}{10}$—$\frac{2}{3}$ inch nearly), at a distance of about 1 cm. ($\frac{4}{10}$ inch nearly) from the globe.

The right eye was divided into two halves by a horizontal [? vertical] section. The anterior part of the eye and the vitreous appeared perfectly normal.

The optic disc is irregularly swollen, and elevates itself 1 mm. (·0394 inch) above the plane of the choroid. The swelling somewhat abruptly descends at a distance of about 2—2$\frac{1}{2}$ mm. (·0787—·02985 inch) from the entrance of the vessels, into the retina. The diameter of the optic nerve at the level of the choroid amounts to 2·2 mm. (·086C inch). In cross-sections through the optic nerve, at a distance of 1 cm. ($\frac{4}{10}$ inch nearly) from the globe, the connective-tissue through which the nerve bundles normally run, appears greatly thickened and interspersed with numerous nuclei; the unattached meshes between these are filled up with a delicate nucleated tissue which abounds in numerous finely granular nuclei, and very thin, often broken and pale fibres. Preparations made by teasing showed no well-developed nerve-fibres anywhere. By soaking in carmine-fluid, the cross-sections acquire a uniform, even, red tint, and chloride of gold did not show any action upon nerve-fibres. The increase of

connective-tissue is most evident in the vicinity of the vessels, and in the inner sheath. The whole length of the nerve was seen to be similarly affected. The part connecting the latter with the chiasma had not been removed from the body. Cross-sections made just in front of the commissure on the right side, however, allow the preceding arrangement of connective-tissue and nerve-elements to be less distinctly recognized. Pale fibres of connective-tissue, of varying thickness, repeatedly interlacing with each other, make up the greater part of the whole tissue, over which are scattered a multitude of large and small nuclei, and cells, and free fat-globules, with a finely granular detritus (basis). Sections behind the chiasma, with the exception of the entrance of the optic tract into the brain-substance, show that the tissue here consists of a delicate fibrillar tissue, with numerous exudation-granules, cells, and free nuclei of varying size, fat-globules, and a finely granular detritus.

At the level of the sclerotic the whole nerve is traversed with a very thick, coarse, fibrous tissue, running longitudinally. This is interspersed with a great number of small nuclei, often closely crowded together; whilst the longitudinal fibres almost entirely disappear. Just above the level of the choroid, this tissue is somewhat abruptly merged into one consisting of pale, somewhat thick, and interlacing bundles. The interlacings, which extend irregularly in all directions, leave very clear, round, or oval lacunæ between them (Fig. X). In these, as well as scattered all through the tissue, is an excessive quantity of nuclei. This tissue extends around the margin of the disc into the thickened retina, and intrudes itself into this, so that it replaces the inner granular layer (Fig. XI). As far as this mass of connective tissue invades the retina, no trace of an inter-granular layer or of rods and cones can be recognized; both, however, are met with at some distance from the margins of the optic disc, very distinct, and to all appearance properly developed. No ganglionic cells

could be met with in any part of the retina. The thickness of the areolar layer is from 0·48 to 0·5 mm. (·0189 to ·0197 inch). Towards the surface of the optic disc these interspaces (Lücken) gradually become smaller, the arrangement of the tissue in bundles is less evident, and is replaced by a delicate, but irregularly-disposed tissue resembling felt, and abounding in granules. Closer examination, especially of teased-out preparations, shows that this is chiefly made up of pale, delicate, and frequently homogeneous, repeatedly broken fibres, mixed with some exhibiting marked dilatations. In some of the preparations from the thickest part of the disc, which was of course the most prominent, thicker fibres, with dark, finely granular contents, and here and there very evident spindle-shaped dilatations, were met with.

The thickness of the retina measured at a distance of 1 mm. (·0394 inch) from the commencement of the choroid, amounts to $\frac{2}{7}$ mm. (·0112 inch), whilst the thickness of the layers of nerve-fibres at this spot is only $\frac{1}{7}$ mm. (·00281 inch).

The result of the examination of the left eye and its optic nerve was closely parallel with that of the right. Only the disc of this was more evenly swollen, and the retinal thickening extended 0·75 mm. (·0295 inch) further in the immediate neighbourhood of the disc than it did on the right side.

Case VI.

Dr. Hughlings Jackson had this case for a long time under observation, and he stated that the complete atrophy of both optic nerves, which was present during the last part of the patient's life, had been preceded by optic neuritis. There was syphilitic disease of each cerebral hemisphere.

Dissection of the Eyes.

Left Eye.—The eye was entire with 3·7 cm. (1·46 inch) of its optic nerve. The size and configuration of the

globe normal, its consistence very soft. The optic nerve, up to its entrance into the eye, appears of uniform thickness (4 mm. = ·158 inch in diameter). The external sheath is very vascular, and in the neighbourhood of the globe is evidently wrinkled. A transverse section through the central, middle, and peripheral ends shows the optic nerve itself (without the sheath) to be very thin, in the central part 3 mm. ($\frac{1}{7}\frac{2}{0}$ inch nearly), in the middle and peripheral (close to the globe) not quite 2·9 mm. ($\frac{1}{7}\frac{1}{0}$ inch nearly) in its greatest diameter. The nerve itself has a greyish-red colour. The red colour is seen on closer examination, and especially when examined with a magnifying lens, to be produced by numerous vessels traversing the proper nerve-tissue. At a distance of 1·2 cm. (·473 inch) from the globe, the usual uniform tint occurs, whilst at a distance of 2 cm. (·78 inch), a whitish spot is seen, implicating the centre of the nerve, which is resolved by a lens into a network consisting of whitish fibres; finally at the central end the whole nerve is almost uniformly made up of the latter tissue. A glance into the interior of the eye shows that the calibre of the vessels is pretty considerable, and that they are rather tortuous. In the immediate vicinity of the disc they seem somewhat obscured, and cannot be traced with distinctness to the centre of the disc. The latter event seems to be caused by a whitish-grey stippling proceeding from the centre of the disc, that extends below, but more especially directly above, somewhat further into the retina. For some little distance the principal vessels are accompanied by clear white patches on both sides (many extending as much as 5—6 mm. = ·196—·206 inch).

The microscopic examination of the optic nerve shows an extremely unusual development of the interstitial connective tissue.

Between the different meshes, which were sometimes plainly visible, there is a finely granular substance. The whole tissue is, as it were, sown with round and oval

nuclei, whilst at certain places, especially those nearest the centre, were a great number of exudation corpuscles. Very numerous vascular anastomoses traverse the whole tissue. In teased-out preparations atrophied nerve-fibres could be demonstrated along with numerous connective tissue and elastic fibres. These changes extended in a precisely similar manner to the intra-ocular termination of the optic nerve. On the other side of the lamina cribrosa there was a very great increase of cells and nuclei, with marked addition to the connective-tissue. The latter is more particularly strongly developed, at the place where the vessels emerge from the centre of the disc, so that the greater part of the disc itself is evidently made up of connective-tissue. This also extends itself somewhat into the retina, along the track of the great vessels. The rest of the disc consists of an irregular delicate fibrillar network, which is filled with a great number of nuclei. Preparations made by teasing, show the tissue to consist here of delicate, sometimes slight, at other times broken, broad, pale, and homogeneous fibres, between which, along with a finely granular detritus, there are a great number of finely granular round, oval, or irregular nuclei. Occasionally broad, ribband-like fibres, with broken outlines, can be demonstrated, with pale, finely granular contents, and they sometimes display at their termination a usually irregular, but strongly light-refracting nuclear outline, of the same size and similar contents to those contained in the remaining tissue. This state of things extends from the margin of the disc into the nervous layers of the retina. The distance of the highest point of the disc from the lamina cribrosa was somewhat less than normal.

The *right eye* with its optic nerve was very similar to the left. Only the obscurity of the optic disc appeared less marked to the naked eye than in the left eye. Microscopically there was very little difference between the two.

Case VII.

William F., æt. 15. I extract the following notes from a long account of the disease.

The patient was first attacked by pains in the head in January, 1865, along with strong convulsions, with which total loss of sight was very soon associated. In April, 1865, the first two symptoms left him, and the patient found himself comparatively well, until May, 1867. Then the earlier symptoms recurred with greater severity. The patient fell into a comatose condition, whilst there was retention of urine, and obstinate constipation. These symptoms also subsided, from August, 1867, until the patient was again attacked in January, 1868. Very severe pains in the head, tonic and clonic convulsions, sometimes three or four times a day, long-continued vomiting, which generally immediately followed the ingestion of food, were the principal symptoms. There was absolute amaurosis. An ophthalmoscopic examination, made a few days before death, showed on either side white and atrophic discs, the arteries and veins few in number, and of small calibre. Death took place on the 16th March, 1868, during an attack of convulsions.

As regards the results of the post-mortem, I learn from Dr. Bader that a cysticercus was found in the right hemisphere of the brain.

Anatomical Examination of the Eyes.

Both eyes with their optic nerves were preserved for examination. The left optic nerve was 2·2 cm. (0·87 inch) and the right 3·2 cm. (1·26 inch) in length. The globes were extremely hard, owing to long immersion in chromic acid, however there was nothing abnormal externally.

Right Eye.—The long diameter of the optic nerve, which throughout its course presented no remarkable difference in thickness, measured at the middle of its length, amounted to 5 mm. (·1968 inch). Of this not quite 3 mm. (0·12 inch) belong to the nerve, and rather more than 2 mm. (0·0784 inch) to the sheath. Transverse sections at the central end of the optic nerve show the external

sheath to consist of a thick, stout connective-tissue, the wavy bands of which are extremely well marked. In the inter-vaginal wide-meshed substance, a great number of round and oval cells, and here and there spindle-shaped ones, containing clearly-defined nuclei; and there were free nuclei also. The same elements could be demonstrated in the equally thickened and loosely-formed inner sheath. Transverse sections of the nerve show the whole tissue infiltrated (*lit.* sown over with) an immense number of small, finely granular strongly light-refracting nuclei. In some situations, and this more especially in parts lying near the centre of the nerve, there are found, along with these elements, many large, finely granular dark cells made up of nuclei (exudation-corpuscles). Instead of the proper bundles of optic nerve-fibres, there appears in the peripheral parts of the nerve a network consisting of many delicate and transparent fibres, which, towards the centre, assumes a more wrinkled and intricate structure. The interstitial connective-tissue is coarse, very abundant, and furnished with many capillary vessels. The latter, but more particularly the central vessels, have their walls everywhere considerably thickened. Preparations made by teasing exhibit, in the midst of an intricate detritus, a multitude of the cells and nuclei above described, along with many atrophied nerve-fibres, and stout bundles of connective-tissue. By carmine tinting the whole tissue acquires a lively red coloration. Chloride of gold had no effect on the nerve-fibres. Almost all these changes affect in a nearly similar manner, the entire length of the optic nerve, only in the vicinity of the entrance of the vessels into the eye, the increase of connective-tissue is more strikingly evident, and here the exudation-corpuscles are no longer met with. Transverse sections through the middle of the disc, and part of the optic nerve, show the surface of the former to be very slightly depressed. The thickness of the retina, measured from the commencement of the choroid, amounts to 0·34 mm. (·0134 inch). The

middle of the disc is composed of a clear transparent connective-tissue. This is very strong, and abounds in spindle-shaped oval, and rounded cells, and finely granular nuclei, and embracing all the capillary vessels. This tapers to a point posteriorly, and accompanies the central vessels in their whole course through the nerve. In a similar manner it pursues the vessels for a considerable piece of the retina (Fig. XII). The rest of the disc consists of a delicate fibrillated tissue, interspersed with an excessive quantity of free nuclei, which extend themselves into the contiguous parts of the retina, and principally implicate the nervous layers of it. At a distance of 2—3 mm. (·0784—·1182 inch) from the confines of the disc, these elements strikingly diminish in quantity. The layer of nerve-fibres is thinner here than in the normal condition, and consists of only a few fibres running longitudinally. No ganglion cells could be clearly made out in any part of the retina, whilst the remaining layers appeared normal, with the exception of the layer of rods and cones, which had undergone post-mortem degeneration. The part of the optic nerve which is embraced by the scleral-ring (margins of the porus opticus) exhibits a very evident increase of its diameter, in the middle portion. The latter, in particular, exceeds the diameter at the level of the pigment-epithelium of the choroid by 0·03 cm. (0·012 inch), and that in the plane of the optic entrance itself by 0·05 cm. (0·0197 inch). On account of this the part of the optic nerve surrounded by the scleral-ring assumes a mushroom-like appearance.

This was evident in all the preparations. The choroid and the remaining structures of the globe were normal.

The left eye showed similar changes, with the exception of quite unessential and trifling differences.

The preceding results of dissection show various stages of degeneration in the optic nerve existing in connection

with intra-cranial diseases. I have placed them together, one after the other, in a series which seems to me to correspond in order of time, as far as pathological anatomy enables us to form a judgment, with the stages from the earliest commencement to the final changes induced by the morbid processes. The descriptions have been entirely objective in character, in order that the reader may form his own judgment whilst perusing them. Although, in spite of this, I shall not omit to add a short *résumé* of the views I have formed during this investigation, this is by no means done with the intention of prejudicing or preoccupying the reader's judgment, but only to call attention to some new facts rendered evident by these anatomico-pathological descriptions, and at the same time to point out plainly the points which still require further confirmation. In my opinion the drama of these degenerations is far from being played out yet (die Acten noch lange nicht geschlossen). As regards both the dependence of the affection in question upon the cerebral disease, and in relation to the real nature of the processes themselves, various opinions are still prevalent. Unanimity is wanting, especially as regards the anatomical explanation of the changes demonstrable by the ophthalmoscope, and it is still debated what elementary changes constitute the principal part of these. Were this obtained, we should be able to guard ourselves better from the danger (arising from the varied ophthalmoscopic appearances, partly due to the different stages, partly to unessential phenomena) of drawing the inference that these are equally varied cerebral affections; and we should thus gain the best indication (Fingerzeig) as to how far the process depends upon cerebral disease.

In spite of the very varied ophthalmoscopic appearance in the preceding seven cases, I am compelled to consider all as belonging to one and the same species of morbid degeneration, and to comprise the anatomico-pathological changes in the point of view I am about to describe. In the cases which were examined the earliest, the venous

hyperæmia of the retina, with simultaneous discoloration of the disc, and mushroom-like swelling of the latter, were most strikingly evident. The latter circumstance, which was marked not merely by its height but by its lateral extension at the level of the choroid, is shown best in Fig. 1, which represents a pretty advanced stage of this, and is taken from a preparation from Case I. At some distance from the commencement of the choroid, this merges, sometimes rather abruptly, at other times more gradually, in the normal thickness of the retina. The thickening extends itself only and entirely to the layer of nerve-fibres, and chiefly by its lateral extension displaces the remaining layers of the retina from their normal points of origin. Simultaneously with these changes, one generally finds the central vessels compressed at the level of the choroid. Closer examination of the thickened layer of nerve-fibres shows that the swelling is chiefly due to a change in the nerve-fibres themselves. These present themselves under the form of uniformly thickened, at other times pearl necklace-like, spindle-shaped, or even sometimes as stout club-shaped swellings. One naturally finds these forms in varying amount in different eyes; thus, for example, in the first two cases the club-shaped swellings were present in great numbers, whilst in three cases, in which the swelling of the disc was present in a less marked degree, there was no trace of them present; on the other hand, a moderate number of uniformly thickened fibres was demonstrable. Fig. 2 gives an accurate representation of the spindle and pearl necklace-like thickenings, taken from the borders of a section, and Fig. 4 one of the club-like degenerations from a preparation teased out by needles. The latter generally show a yellowish colour in the section, and are occasionally furnished with an apparent nucleus, of rounded or irregular form. They principally occur in association with extravasations of blood, and exhibit themselves as extremely white patches (plaques) on the retina when seen by the ophthalmoscope.

Under high powers, the contents of the fibres make the impression of being nothing but little drops of fat, yet I could never succeed in obtaining any reaction with ether, which is perhaps to be ascribed to their long immersion in chromic acid solution.

The changes thus described are seen to most advantage in their early stages. After the process has culminated in an advanced stage, retrogressive metamorphosis sets in. This appears to consist in a breaking up of the affected nervous elements, and their consequent atrophy; at least one finds in preparations made by teasing, swollen fibres with broken outlines, such as are represented in Fig. 8, and extremely delicate, often abruptly broken (gekinckte) fibres, of very irregular course. Simultaneously with this destruction there is in most cases a shrinking and flattening of the disc; that this, however, does not always occur is proved by Case V, in which, along with perfect atrophy, a very swollen condition of the disc was demonstrable, due to a great increase of the connective-tissue. According to the degree in which the process has implicated the nerve-fibres in any given case, will, naturally enough, depend the successive results of these changes on the faculty of vision.

It is also doubtful what are the shares of the connective-tissue associated with the intra-ocular terminations of the optic nerves and of the blood-vessels respectively, in these morbid changes. To discriminate between connective-tissue and nerve-fibres on the other side of the lamina cribrosa is admitedly an extremely difficult task, and indeed in some cases it is absolutely impossible to say which of the two is before us. Even coloration with osmic acid, chloride of gold, and carmine often leaves one in the lurch, and one always judges best by the course of the fibres, and includes here chiefly the connective-tissue fibres which run transversely, traversing the several bundles of nerve-fibres till they reach the eye. By comparing these with many of my preparations of normal eyes, I could not suc-

ceed in the first two cases, which I regard as early stages, in establishing any increase of the connective-tissue. It was still more difficult to get a clear idea of the significance of the nuclei which were evident in all the preparations. Two circumstances must be particularly remembered in forming a judgment on this point. First, finely granular nuclei are often met with in considerable quantity just beneath the lamina cribrosa, quite normally, and may be traced from this into the highest region of the disc; and then too, through the swelling of the nerve-fibres, and the way in which sections are made, there occurs an optical delusion very often, simulating nuclei, so that one might very easily be led to adopt the opinion that there was an increase in the number of nuclei. Teased-out preparations afford the best means of judging of this, and by means of these it was not possible in the first two cases to demonstrate any particular increase of nuclei. These facts justify, in some degree, the opinion, that in the commencement of the process the share of the connective-tissue in the swelling is extremely small, and almost null, and that simultaneously with the swelling of the nerve there may perhaps be a very slight multiplication of nuclei. In the later stages, and perhaps even at the height of the swelling, the increase of nuclei and connective-tissue may take a more prominent part. The latter is particularly well developed around the central vessels. The more advanced the stage, the less nervous elements are discoverable, and therefore, at the same time, the more sunken is the optic disc. Partial or total atrophy thus represents the final stage of the whole process. In the latter, along with unusual increase of the connective-tissue around the vessels, remains of destroyed, swollen, and atrophic nerve-fibres, along with a great number of nuclei, are strewn all over the tissue; in the former there are the same elements, but mixed with a certain proportion of well-developed nerve-fibres.

As regards the behaviour of the vessels, an increase of

the smaller vessels may be safely affirmed in the earlier stages, both in the disc itself, and in its immediate vicinity. That this circumstance contributes towards the swelling of the disc, is manifest, and this will be still further the case, when the previously existing congestion has resulted in transudation into the disc, a possibility which cannot be disputed *à priori*, and for the existence of which many observers adduce evidence. I have not been unmindful of this so-called *œdematous* condition of the disc, but must confess that I have been unable to actually verify this in any of my preparations. Although it is doubtless an awkward task to diagnose an œdematous condition of such a tissue by microscopic examination, yet I was the less inclined to admit such a cause for the swelling of the discs, because I found what seemed an ample explanation in the swelling of the nerve-fibres, and the copious development of new vessels.

I do not mean to say that I deny the occurrence of such an exudation, since some of the cases seem to favour it, in which there has been found great swelling, with comparatively little degeneration of nerve-fibres, and an insufficient development of new vessels to serve as a sufficient cause for the prominence of the disc; only I want to explain, as far as I can here, that there is never any question of lymphatic exudation. I have in my collection preparations made from eyes, in which, as the result of a lesion in the neighbourhood of the disc, a swelling of the latter and of the retina also has occurred. A single glance at the microscope suffices to convince one how characteristic such lymphatic exudations appear. The whole region of the disc, down to the lamina cribrosa, and all the retinal layers, are crammed in such cases with finely granular, rounded cells (like pus-corpuscles).

Just in the same way as nerve-fibres, the vessels which traverse the disc and its surroundings, undergo for the most part during this retrogressive metamorphosis, the same predominant increase of connective-tissue.

Another remark must be added to the description of the above-named changes, although, indeed, it was not present in all, yet in four of the above cases it was so characteristic, that it must not be overlooked. This is, namely, the dilatation of the inter-vaginal space directly behind the globe. This is, as I was able to demonstrate in fresh preparations in Case III, filled with a turbid fluid, containing cellular elements. At the same time one finds the connective-tissue between the two sheaths thickened, and very often arranged in coarse bundles (Fig. IV). The structure of the optic nerve itself in four of the cases, so far as it could be examined, was perfectly normal; in the other three cases, along with complete atrophy of the discs, there was also atrophy of the optic nerves all through the portions which had been removed for examination. I will not now raise the question whether we have to do in these cases with a neuritis descendens or not; and this simply for the reason that up to this time I have never been able to examine an eye with its optic nerve, of which I could certainly predicate that the inflammatory process had gradually travelled along the optic nerve towards the disc, and so I cannot myself form any judgment on the matter; and, as regards the rest, I don't think that we need to embarrass ourselves in order to explain the atrophic processes; but that we may well admit that we have to do here with that kind of atrophy, which is wont to occur sooner or later with this sort of change [in the brain], and such as may occur, either wholly or partially, in other conditions of longer existence.

I have thus, as s evident from the foregoing, brought the changes which develope themselves in the discs, and their immediate neighbourhood, as a sequence to cerebral disease, into one point of view, because the anatomical changes may lead us to the discovery of the principal facts of these processes. If we make any division for practical purposes, it seems to be best to divide them into two groups :—

I. Those forms in which the development of new blood vessels, with perhaps the consequent transudation into the tissue of the disc, is the prominent feature.

II. Those forms in which the swelling of the nerve fibres (answering to fatty degeneration of these) occurs chiefly in the eye itself, and is the principal cause of the swelling of the discs.

The latter form, in which the changes of the nerve-fibres commonly extend themselves somewhat further into the retina, and in which it is not unusual to find extravasations of blood, and which indeed in some cases may simulate a retinitis morbus brightii [*sic*] is best distinguished by the name of *neuro-retinitis circumscripta;* the second form, on the other hand, which finds its type in the peculiar congestion of the disc, is best named *neuritis optica.* This distinction is by no means new, it has been in use a long while, and is principally borrowed from ophthalmoscopic researches. And although, indeed, very extreme cases may exhibit considerable anatomical distinctions, yet one can always demonstrate, in the cases of the second group, a fresh development of vessels in the discs, and in these the first changes in the nerve-fibres will be found. It is further satisfactorily determined, by ophthalmoscopic examination, that the first form not infrequently passes on into the second. Neither one form nor the other allows us to draw any safe conclusions as to the kind, or the seat of the central disease which exists.

Another very important question appears to me to arise, in the explanation of the connection between brain disease and the changes in question which affect the optic disc. I naturally consider here only those cases in which the communication (optic nerve) is not to be regarded as the originator, or principal agent (Fort-leiter in the morbid process).* Up to the date of this, three different expla-

* As mentioned before, I have, up to this time, never had an opportunity of examining an eye of which I could safely assert that the morbid process had crept from the brain along the optic nerve till it reached

nations of this have been given, of which the two first presuppose an increase of the intra-cranial pressure. They are as follows :—

1. Through the increased pressure within the cranium, pressure is brought to bear upon the cavernous sinus, which induces venous congestion in the central vessels of the optic nerve, which is also increased, as regards this, by the scleral ring (von Gräfe).

2. The intra-cranial pressure must force the fluid from the arachnoid space along the sheath of the optic nerve into the canal-like system present in the lamina cribrosa; and thus swelling, congestion, and the inflammatory symptoms dependent upon these, take their origin (Schmidt).

3. The third explanation, propounded by Benedict, asserts that the symptomatic neuro-retinitis (neuro-retinitis as a symptom of a vaso-motor disturbance) depends in the majority of cases upon a morbid innervation of the sympathetic, which is again itself a symptom of the most varied cerebral disorders (Processe).

Against the first theory, there are the following objections :—

1. The cavernous sinus is a blood-canal, surrounded with such impervious walls as are rarely to be met with, and a pressure sufficient to really compress this must, since the pressure within the cranium must be regarded as equal in all directions, exercise enormous pressure on all the other blood-vessels.

2. The vena ophthalmica superior, and vena ophthalmica inferior anastomose extensively both with one another, and also with the facial vein. And although the vena centralis retinæ empties itself almost immediately

the disc. But the more I have employed myself in researches of this kind, the more doubtful do I become as to this mode of origination of the changes met with in the disc. However, as regards this, we shall derive the best assistance from those colleagues who specially interest themselves in diseases of the brain and nervous system, and have a large material to draw upon.

into the cavernous sinus, yet it previously anastomoses freely with the vena ophthalmica superior. But besides these anastomoses, it is quite indifferent whether the discharge takes place at the vena ophthalmica or into the cavernous sinus, since both are continuous, and the return of the blood suffers no hindrance so long as the way through the facial vein is patent (*Sesemann*).

3. Not every increase of cerebral pressure is followed by neuritis, and undoubtedly neuritis occurs where there is no such increased pressure.

4. Optic neuritis is sometimes one sided, and indeed has been often observed on the side opposite to the cerebral lesion, whilst the eye on the same side has remained perfectly normal (Case II).

The above-quoted 3rd and 4th facts may be adduced against the second theory. Yet apart from these, one would be inclined to accept the theory, as soon as one became convinced of the existence of such a system of canals in the lamina cribrosa as are presupposed. Hitherto I have not been so fortunate. The dilatation of the inter-vaginal space (between the outer and inner sheaths of the optic nerve) was indeed revealed in a very suggestive (prägnante) manner, yet it would not be difficult to explain this by a surmise that it had its origin in an inflammatory process previously existing in the disc.

Case V lends most countenance to this view, namely, in regard to the lacunous formation somewhat above the level of the choroid, yet since even here we have to do with a really atrophic process, this also is by no means conclusive.

The third explanation actually gains strength from the objections made against the two others, and Benedict especially calls attention to his successes with the constant current. From the point of view of pathological anatomy nothing special can be said either for or against it, since points of contact are wanting. However, in the majority of cases we shall do best to content ourselves with this,

if we must have an explanation at all, although it is partially inaccurate, and also requires further confirmation. In my view then, the affair stands thus:—The irritation conveyed through the nerve-tract of the sympathetic to the disc, induces the changes of the nerve-fibres, the hyperæmia, and even the development of new vessels, and in this manner, a swelling, and obfuscation (Trübung) of the disc, and the adjacent parts of the retina is brought about. The latter may then for its part have as a consequence an extreme degree of congestion of the venous system of the retina.

In any case it is very easy to bring the analytical facts in accordance with this explanation, and the very often asserted facts of the swelling of the optic disc of one eye only, is most easily explicable on this hypothesis.

Fig I.

Fig II.

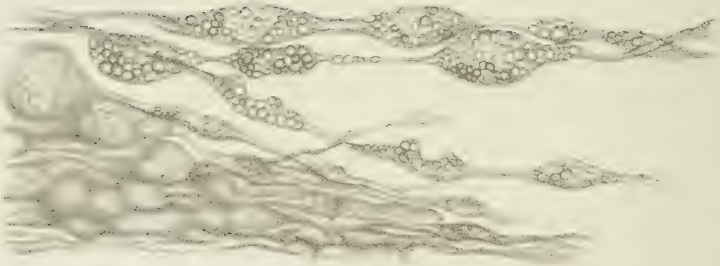


Fig III.

Fig IV.

E. Burgess sc.

Fig. V.

Fig. VI.

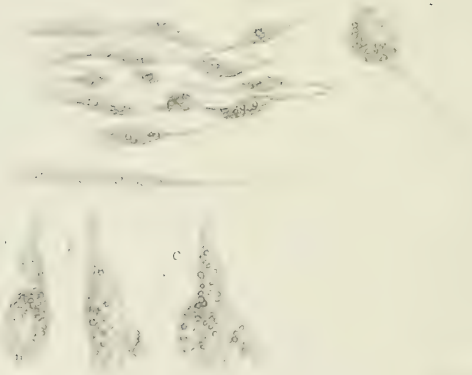


Fig. VII.

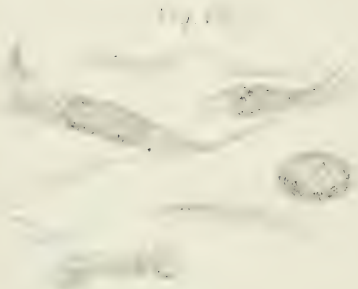


Fig. VIII.

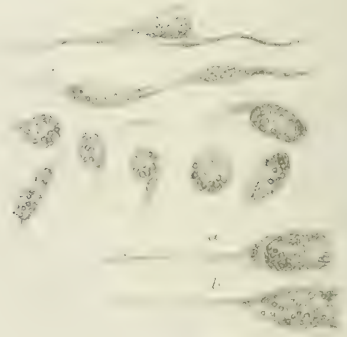


Fig. IX.

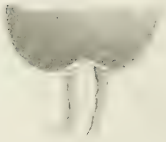


Fig. X.

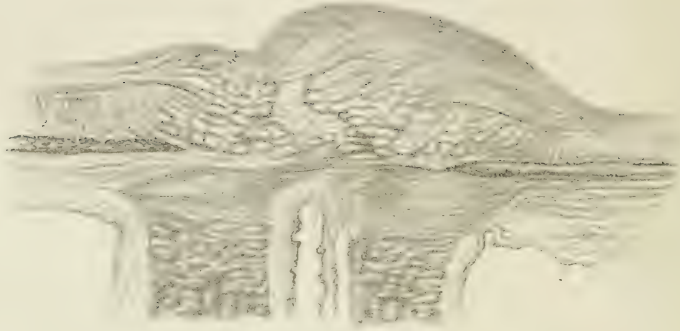
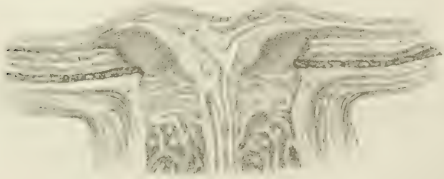


Fig. XI

Fig. XII



EXPLANATION OF THE FIGURES.

Plate II.

Fig. I.—Swollen disc (from Case I), 15 diameters; Swelling of the layer of nerve-fibres; Displacement of the remaining layers of the retina, with compression of the central vessels.

Fig. II.—Spindle-shaped, and pearl-necklace-like swollen fibres from the free border of the swollen disc (from Case I), 550 diameters.

Fig. III.—More uniformly swollen nerve-fibres (from Case I), 550 diameters.

Fig. IV.—Club-shaped, swollen nerve-fibres from the white patches (plaques), seen by the ophthalmoscope (from Case I), 550 diameters.

Plate III.

Fig. V.—A section through the right (R) and left (L) optic nerve entrances, as well as a transverse section through the right optic nerve (S), where the sheath was most dilated (from Case II); natural size.

Fig. VI.—Isolated swollen nerve-fibres (from Case II, right eye), *a*, *b*, *c*; The very same swollen nerve-fibre in different positions, explaining the nature of the apparent nuclei (550 diameters).

Fig. VII.—Swollen nerve-fibres (from Case III), with apparent nuclei (550 diameters).

Fig. VIII.—Similar figures as in Fig. VIII, with fine nuclei; *a* and *b*, the same fibre in different positions.

Fig. IX.—Swollen, atrophic disc, with atrophy of the optic nerve, and marked dilatation of its outer sheath (Case V); section of natural size.

Plate III bis.

Fig. X.—Section made through the disc (of Case V, right eye); Uneven, moderate swelling; Strong transverse markings of connective-tissue in the planes of the sclerotic and choroid; Representation of the areolar tissue at the level of the retina, and extending right into the layers of this (20 diameters).

Fig. XI.—The progress of this areolar tissue towards the retinal layers (150 diameters); fibres springing from the areolar tissue extend into the outer granular layer, and displace the retinal layer somewhat outwards; (*a*) layer of atrophic nerve-fibres; (*b*) granular layer; (*c*) external granular layer; (*d*) internal granular layer; (*e*) pigmentary layer of the choroid. The ganglion-cell layer, the intervening granular layer, and the layer of rods and cones are deficient.

Fig. XII.—Atrophic disc, succeeding a swollen one; Great development of connective-tissue, particularly in the region of the vessels (from Case VII). The displacement of the remaining layers of the retina, through the layer of nerve-fibres is also indicated.

LONG PERSISTENT DIPHTHERITIC CONJUNCTIVITIS FOLLOWING MEASLES.—LOSS OF BOTH EYES.—SCARLET FEVER OCCURRING DURING THE COURSE OF DISEASE.

By Frederick Mason, Esq. (Bath.)

September 20th, 1870.—A healthy-looking, well grown child, aged eight months, was brought to me by his mother, who stated that in August the child had suffered from measles, from which he recovered; but shortly afterwards she noticed something within the eyelids, having the form of the lids and surrounding the eye. She got all away from the right, and this eye quickly recovered. She was unable to remove the whole of the false membrane from the left, and this continued to increase, and was accompanied by discharge.

At this time (Sept. 20th), the right appeared healthy, but the lids of the left were much swollen, with a thin discharge issuing from between. On separating the lids, a yellowish-grey membrane, about 2‴ thick, was seen surrounding the eye, and having the shape of the lids. The eye itself looked healthy. This membrane was easily torn off with the forceps, when there was free bleeding, which was checked by application of cold water. A solution of sulphate of copper was ordered to be dropped into the eye three or four times a day.

October 1st.—The eye in same state, the false membrane of same size, and as easily detached.

October 12th.—Membrane of same size. Swelling of lid less. On everting the upper lid, the growth was seen to be attached to conjunctival surface by a flat, broad base, and throwing off a free margin all round, like a lichen on an old tree.

The free margin was easily torn off, followed by bleeding, but no scraping or picking would remove the central attached portion; this was rubbed with nitrate of silver. The conjunctiva of lids was soft, swollen, and vascular. The upper incisors were just appearing, and the margin of the gums around the teeth was covered with a similar patch of whitish membrane. Borax to be applied to the gums, and the child to take chlorate of potash, with tincture of perchloride of iron.

21st October.—No improvement. I now applied nitric acid to inner surface of the lid.

27th.—Improved, but still growing. Again touched with nitric acid.

In consequence of the child having to be brought a distance of 20 miles, the attendance had hitherto been very irregular, and I did not see it again for 12 days.

November 8th.—Both eyes now diseased. The mother says that for three days after the 27th October she thought the child well, when he appeared to take cold, and both eyes became rapidly affected.

The lids of both greatly swollen, a thin, yellowish white discharge from both. The conjunctiva, covered with a broken, whitish, false membrane, which had now extended over the corneal surfaces, and both eyes destroyed. The eyes had a peculiar shrunken look. There was also a patch of greyish white membrane on the frœnum beneath the tongue. Solution of nitrate of silver dropped into both eyes.

The mother now removed nearer Bath, and the child was seen more frequently, but up to the 18th there was no improvement.

November 23rd.—The child is now suffering from an attack of scarlet fever; the mother first observed the rash on the 21st. The eyes much the same; the membrane on the lids not so thick; the discharge thinner, but more abundant. There is also a profuse discharge, of the same yellow colour and consistence, from both nostrils.

25th.—Rash very pale. Discharge from nostrils less, whiter, and thinner.

28th.—Rash disappeared. Very slight discharge from nostrils. False membrane on eyelids less.

December 5th.—Eyes somewhat improved. Still some discharge from nostrils, and a similar discharge from both ears.

Since that time to the present (March 2nd, 1871) the child has improved in health. Discharge from nose and ears has ceased, but in spite of all the remedies employed (carbolic acid with glycerine, B.P. solution of hyposulphite of soda, nitrate of silver, zinc, alum, &c.), there is still the tendency to the formation of false membrane on the mucous surfaces of the lids, but which is more easily detached and wiped away than it was at first, and there is very slight discharge. The eyes are quite destroyed;

there is staphyloma of both corneæ, the surfaces of which are thickened and opaque. The child now keeps the eyes open.

The tarsal surface of the left is free from the false membrane, whilst the ocular surface is covered with it. The right the membrane covers the tarsal conjunctiva, and when removed it appears as if it took the place of a healthy and true epithelium.

In the case now brought forward it will be noticed that the child had measles in August, and it was after he had recovered that the mother noticed a growth within the eyelids. At the end of September, when I first saw the case, the eyes themselves were unaffected, and I was deceived by the appearance into the idea that in the left there was sloughing of the cellular tissue of the orbit around the eyes, and it was not until the third visit, when I was enabled to completely evert the upper lid that I discovered the mistake.

In October diphtheritic patches were observed on the gums and tongue, and at the end of November there was scarlet fever, attended with discharge from nostrils and ears, from which the child recovered without making any perceptible difference in the condition of the eyes.

As the title Diphtheritic Ophthalmia has been disputed by Dr. Mackenzie and others, I have been somewhat undecided what name to give to this disease; but by whatever name it may be called the disease remains the same, and fortunately it is a most rare one in England. If it had not been for the occurrence of diphtheritic patches on the gums and tongue, it would have resembled more nearly the description given by Bader ("The natural and morbid changes of the human eye") of "membraneous ophthalmia," as distinct from "diphtheritic."

Soelberg Wells ("Diseases of the Eye") commences the chapter on diphtheritic ophthalmia with the following words:—

"This extremely dangerous disease is fortunately very rare in England. I have never yet met with a case of

pure diphtheritic conjunctivitis here, whereas during my residence in Berlin I had the opportunity of seeing many cases in Von Graefe's clinique."

Soelberg Wells describes the membraneous form of ophthalmia as occasionally occurring in the course of severe purulent ophthalmia, and not as Bader does, as a distinct disease.

Mackenzie ("Diseases of the Eye") does not mention either form of disease.

The only cases I can find recorded as having occurred in England are—

At page 981, vol. for 1857, of the "British Medical Journal," is a paper (previously read at one of the meeting of this branch) by Mr. Pritchard on diphtheritic conjunctivitis, in which he says, "I have now seen 9 or 10 cases of acute conjunctival inflammation in young children, where, instead of the ordinary serum, mucus, or pus, fibrin has been effused, of the same physical characters as that effused in a recent case of acute pleurisy, which has adhered to the lids, and when unchecked by treatment has spread over the surface of the globe and destroyed the sight." Mr. Pritchard relates the history of one case occurring in connection with scarlet fever, other members of the same family of five suffering from diphtheritic affection of the throat.

In the second volume of the "Ophthalmic Hospital Reports," page 130, Mr. Hutchinson has published a detailed account of a case of diphtheritic ophthalmia occurring in conjunction with the poison of scarlet fever, and in his remarks says, "the case was one of a class entirely new to myself."

At page 363 of the fifth volume of the "Ophthalmic Hospital Reports" is a short abstract of a case which was treated in the St. Petersburgh Eye Hospital, and which terminated in death on the tenth day.

In the "British Medical Journal," June 5th, 1858, is a report by Mr. Thompson, of Launceston, on diphtheria,

who out of 485 cases only saw the eye attacked in one instance.

Dr. Greenhow, in his work on diphtheria, referring to Mr. Hutchinson's case, says, "the rarity of diphtheritic ophthalmia may be inferred from the circumstance mentioned to me by Mr. Dixon, that out of the thousands of cases which annually come under the notice of the surgeons to the Royal Ophthalmic Hospital, this is the only genuine case of diphtheritic ophthalmia he had ever seen. This fact is the more remarkable, as it appears from the statements of French, and especially of German writers, that this particular form of disease is by no means uncommon abroad."

At page 175, second volume, "Ophthalmic Hospital Reports," are some remarks by Dr. Mackenzie on Mr. Hutchinson's case, in which he regrets that Mr. Hutchinson has used the name diphtheritic ophthalmia, as he considers the diphtheritic exudation to be only one of the symptoms of the ophthalmitis, which may be idiopathic, traumatic, and phlebetic, and may follow measles, small-pox, scarlatina, and typhus, being in these last instances in all likelihood pyæmic, or dependent on purulent infection of the blood."

Dr. Mackenzie also ("Medical Gazette," vol. xxxv, page, 594) says, "While he has observed as one of the consequences of ophthalmitis the production of false membranes on the conjunctiva, denies that there is any special form of ophthalmia which can with propriety be termed diphtheritic." In the cases related by Mr. Pritchard, he believes that the ophthalmia was the result of scarlatina poisoning.

STATISTICAL DETAILS OF FOUR YEARS' EXPERIENCE IN RESPECT TO THE FORM OF AMAUROSIS SUPPOSED TO BE DUE TO TOBACCO.

By Jonathan Hutchinson, F.R.C.S.

In the year 1864 I published, in the first volume of the "London Hospital Reports," under the title of "Clinical data respecting Cerebral Amaurosis," &c., a report on cases supposed to be connected with tobacco. I then gave all the cases of which I had notes which appeared to resemble the form due to smoking, including a considerable number in which it was quite certain that the habit referred to was not the cause. After this date, I carefully kept notes of every case bearing upon the subject which came under my notice, and, in 1867, the Medico-Chirurgical Society did me the honour to publish in their Transactions a statistical summary of my experience during the three intervening years. The cases included in that (second) report had been much more carefully selected, and from it several classes, which I had deemed it necessary to mention in my first, were wholly excluded. My recognition of the peculiarities of tobacco cases had also become somewhat more accurate. I now have to offer to the reader a third series of cases of the same kind, including most that came under notice during the four years, 1867, 8, 9, and 70. I regret that I cannot say that during this period I have kept notes of quite all that have been under my care, more especially during the year 1868; but those which have been omitted, have been left out simply from want of time to take notes, not from any principle of selection. Each of my three several reports presents a fair picture of my experience in respect to all cases which could be considered similar to those due to smoking. Each includes a few in which I think it very doubtful whether or not smoking was the real cause. I have been most anxious to give to the reader a fair oppor-

tunity of judging for himself as to the clinical features which this form of amaurosis presents in English practice, and of forming his own opinion as to whether the indictment against tobacco is a just one.

Any one who may take the trouble to compare the cases given in these three reports, will be struck by their similarity, and by the remarkable confirmation which the two later papers give to the conclusions of the first. A very great disproportion in the numbers of the two sexes who become the subjects of "idiopathic amaurosis," was one of the facts brought out (for the first time) by my first report. In it the numbers were 37 men and 3 women, and in the second they were 34 men and 5 women. In the present one they will be found to be 28 men and only one woman. There can, therefore, be no reasonable doubt that we have to deal with a formidable type of symmetrical amaurosis which is almost exclusively confined to the male sex. For myself, I may briefly avow that I have scrupulously investigated other possible causes, and that I feel no hesitation in believing that in most of these cases tobacco is the real one.

The facts as regards the one woman whose case is included in the present series, are extremely interesting. Her case in every feature resembled those which in males I attribute to smoking, and upon this point I had made special comment to those who were attending my class. After I had done so, she informed me that one of her sons had formerly been my patient, and that a nephew had been under the care of Mr. Hulke. I referred to my notes, and Mr. Hulke was kind enough also to refer to his, and we each found that the cases had been diagnosed as tobacco amaurosis. In each the patient was a young man and a smoker. Now the lesson of these facts seems to me to support the opinion I have long held, that when tobacco causes blindness it does so in virtue of an idiosyncracy. It is by no means improbable that such idiosyncracy will be found occasionally in several members of the same family,

and further that it may involve liability to suffer from other influences besides tobacco smoking. Thus, then, we have two young men, cousins, attacked by amaurosis at an early age in virtue of an idiosyncracy rendering them liable to special poisoning from tobacco; and we have a woman, who had never smoked, the mother of one and aunt of the other, at a much later period of life becoming the subject of a similar form of nerve disorder in virtue of the same peculiarity of diathesis acted upon by a different exciting cause. In her not improbably the exciting cause was the disturbance consequent upon the cessation of menstruation.

Holding the opinion that there must be some pre-existing peculiarity in the nervous systems of those who become the subjects of tobacco amaurosis, I have been very anxious to discover if possible whether it reveals itself by any other signs. The only points in this direction to which I feel at present inclined to attach any importance are the following. Not unfrequently it will be found that these patients have had unusual difficulty in learning to smoke, and have throughout life displayed special susceptibility to its influence, and that also they have often been beyond the average liable to suffer from sea sickness. In the tabular statement some information will in many cases be found given on these points. My attention to the matter of sea sickness was first given in consequence of the statements of some patients who were sailors, and who specially referred to it.

We have, during the last few years, made the observation that those who suffer are, almost invariably, smokers of *shag*, the most deleterious form of tobacco. As regards the results from disuse of tobacco my impression is strong, that almost invariably when the disuse is real and complete, the state of vision improves. I cannot exaggerate the expression of my conviction as to the duty of urging immediate and complete abstinence in the early stages of this most serious malady. Many of my patients came too

late, having continued to smoke until the disease was far advanced. I have never seen a case in the early stage in which the disease went on to blindness if the patient had strength of will to give up the habit. In a large majority of those in whom, according to the patient's account, the habit was wholly abandoned, I had reason to suspect that it was only reduced. My experience on this point fully confirms that of Dr. Mackenzie, that there are those "who would rather smoke than see." It is very few, however, who have the honesty to admit their inability to give up the habit, and hence a very annoying source of fallacy in our inferences as to the effect of treatment.

It will be seen that in a few cases in the table, the amaurosis set in rather suddenly and advanced rapidly. This fact I always take as a strong one against the diagnosis of tobacco amaurosis, and in favour of that of neuritis. These cases ought, therefore, very probably to have been excluded from the list. As, however, the diagnosis is uncertain, I have preferred to let them stand. It so happens that some of these are the very ones in which no improvement resulted from the disuse of tobacco.

I have to thank my friends Mr. Waren Tay and Mr. Nettleship for much help in recording the notes of the cases and in compiling this report.

Number. Date. Reference.	Name. Occupation. State of Health.	Age. Duration of Amaurosis.	Use of Tobacco and Alcohol.	State of Eyes.	Other Symptoms.	Progress and Remarks.
1. 1867, January 3. C. p. 94.	John Brewer, bricklayer. Has had good health.	22. 18 months.	Has smoked from a quarter to half an ounce of tobacco daily for five years and a half.	Left eye worse than right. Right sees 20 J. Pupils large, and the right one sluggish. Each disc pale, especially at its outer part.	Has been troubled with nocturnal emissions. Denies syphilis. Gradual failure of sight.	1867. March 7. Discs still paler, veins large, arteries small. Vision as before. He now says that he had not smoked for two years before the sight failed.
2. 1867, March 11. C. p. 157.	Samuel Park, shoemaker. Pale, and weak looking.	35. about 2½ to 3 years.	Has smoked for thirteen years; at one time he smoked an ounce of tobacco daily; has left off smoking several times, and resumed it again. Has usually been "worse for liquor" once every few months, but does not consider himself a great drinker.	Vision unequal in the two eyes; right, 1 J. and $\frac{20}{40}$; left, 16 J. and $\frac{20}{200}$. No material difference with glasses. Discs of a redder colour than natural, but otherwise normal. Pupils act well.	History of weakness of sight (probably failure of accommodation) in boyhood. Smoking makes him nervous if he exceeds his usual amount. Sight has varied a good deal within the last two or three years, being, as he believes, worse when he leaves off smoking.	Has several times given up smoking for months together, because it made him nervous (made his hands shake, &c.), but has found that his sight always gets *worse* when he is not smoking. He is convinced that smoking is good for his sight; he gave it up only because it made him nervous.

Number. Date. Reference.	Name. Occupation. State of Health.	Age. Duration of Amaurosis.	Use of Tobacco and Alcohol.	State of Eyes.	Other Symptoms.	Progress and Remarks.
3. 1868,	A woman.	43. 6 months.	Had never smoked. Strictly moderate in stimulants.	White atrophy in both.	None of any moment.	The symptoms had come on gradually, just as in the tobacco cases in men.
4. 1868, March 1. C. p. 259.	Moses Garcia, cabdriver. Looks strong and healthy, though sallow.	53. 9 months.	Has smoked from half an ounce to an ounce daily. Has drunk moderately.	White atrophy of both discs.	At the time when his sight began to fail, his general health was bad; he was nervous and weak, troubled with sleeplessness, diminution of sexual appetite, and flatulence. Was obliged to give up his work, and was three months in the Jews' Hospital for dyspeptic symptoms. Has headache across the forehead. Has had gonorrhœa and chancres many times. No wasting of testes.	The failure of sight coincided in time with general failure of health. He had indulged his sexual appetite very freely.

5. 1869, July 8. C. p. 318.	John Thompson, bailiff, in comfortable circumstances. Florid and robust. Hair, sandy-grey.	60. 9 months.	Has smoked for twenty years; for several years only a little; for five or six years past half an ounce a day. Has drunk alcoholic liquors constantly, but in moderate quantity.	Can see only 20 J. Discs white.	Has been very nervous for several years, especially after smoking in the morning. Many years ago suffered from "lumbago and sciatica," which laid him up for more than a year on and off. Gradual failure of sight.	1869, *Sept.* 2. Has not smoked at all since he came here. His sight has got worse; cannot now count fingers. Discs both equally and universally white; veins and arteries somewhat diminished. *Sept.* 23. Can barely find the position of the window. Pupils contracted; they do not dilate in the dark, but dilate moderately with atropine.
6. 1869, Sept. 23. C. p. 324.	Wm. Billingham.	35. 6 weeks.	Has smoked at least half an ounce daily. Has drunk moderately.	Vision $\frac{20}{100}$ and 12 J. Discs pale at the outer halves; sheath at outer part very distinct, and a little disturbance of choroid. Inner margins indistinct, apparently from tendency to formation of crescents.	Has often noticed a nervousness from smoking. Gradual failure of sight.	

Number. Date. Reference.	Name. Occupation. State of Health.	Age. Duration of Amaurosis.	Use of Tobacco and Alcohol.	State of Eyes.	Other Symptoms.	Progress and Remarks.
7. 1869, July 12. C. p. 327.	John Smith, drayman. Dark complexion, and healthy.	45. 3 months.	Has smoked "as much as he could get," chiefly *shag*. Has drunk moderately.	Vision $\frac{20}{100}$ and 14 to 16 J. Discs decidedly whiter at outer than at inner halves; inner halves look slightly swollen.	Gradual failure.	1869, *Sept.* 2. Vision $\frac{20}{50}$ and 14 J. Considers his sight much better. Has left off smoking entirely. 1870, *June* 30. Vision $\frac{20}{40}$ and 8 J. *Oct.* 13. Just sees letters of 6 J. *Dec.* 15. Just sees letters of 4 J.
8. 1869, October 7. C. p. 337.	ThomasWallis, has been a soldier.	42. 2 months.	Has smoked half an ounce daily for twenty years. Has not been in the habit of drinking while he smoked, and for two years has not drunk at all.	Vision $\frac{20}{200}$ and 16 J. Discs ill-margined, choroid thin, outer half of each disc decidedly pale; veins full, and arteteries not diminished.	Gradual failure.	1869, *Nov.* 4. Vision $\frac{20}{100}$ and 14 J.
9. 1869, October (about). C. p. 339.	James Morris, engineer (light outdoor work); a Scotchman. Health good.	40. 2 months.	Smokes an ounce daily of *pig-tail* tobacco. Drinks several glasses of brandy and some beer daily.	Commencing atrophy of discs.	Gradual failure. Is rather nervous; says he has noticed no ill-effects from smoking except occasional "heart-burn."	

10. 1869, July 5. C. p. 312.	Henry Cartwright, steward on board ship.	35. 2 months.	Has smoked half an ounce daily for twenty years. Has drunk a good deal.	Vision 19 J., and no letters in the distance. Discs decidedly paler at outer than inner halves.	Gradual failure; "is always in a fog." Has had no special inconvenience from smoking.	
11. 1870, Feb. 3. C. p. 366.	Samuel Barnard, stableman. Spare, and rather sallow.	61. 12 months.	Has smoked "moderately" forty years; generally *shag* tobacco. Has been steady, and has drunk chiefly beer.	Vision, right eye cannot quite tell letters of 20 J. Left eye sees 14 J. Discs, right uniformly white; left paler at its outer than at its inner half.	Gradual failure; the right eye began to fail before the left, and is in a more advanced state of atrophy.	Is rather deaf; has been so for a year. 1870, *March* 15. Just the same. *Dec.* 15. Sees 10 J. Has not smoked at all.
12. 1870, Jan. 10. C. p. 354.	R. J. Littleboy, sailor.	55. 2 months.	Has smoked half an ounce daily for thirty years, chiefly *shag and cavendish* tobacco. Has been a great drinker, half a pint of spirits, and two or three pints of beer daily, or more.	Vision $\frac{20}{70}$. Discs pale at the outer halves.	None mentioned.	Has never been seasick. No difficulty in learning to smoke. 1870, *March* 3. Vision $\frac{20}{50}$ and 6 J. (with + 20). *Dec.* 15. His wife reports that he can see to read the newspaper.
13. 1870, Feb. 21. C. p. 379.	George Jones.	30. 18 months.	Has smoked nearly half an ounce daily for six years of *shag* tobacco. Has drunk a good deal of gin and rum, but not generally when he smoked.	Vision, $\frac{20}{200}$ barely, and just sees 10 J. Discs, markedly pale at the outer halves; vessels not much diminished.	Gradual failure. Had no difficulty in learning to smoke; is not sick when he goes on the sea. Memory has failed of late.	

Number. Date. Reference.	Name. Occupation. State of Health.	Age. Duration of Amaurosis.	Use of Tobacco and Alcohol.	State of Eyes.	Other Symptoms.	Progress and Remarks.
14. 1870, March 24. F. p. 4.	Thomas Allen.	53. 6 months.	Has used half an ounce daily, partly smoking, partly chewing, for more than thirty years, *shag* tobacco. Drinks porter, pretty freely at times; does not drink while smoking.	Vision, $\frac{20}{200}$ and 16 J.	Gradual failure; it began as a fog.	1870, *April* 11. Vision $\frac{20}{70}$ and 16 J.
15. 1870, April 11. F. p. 25.	JosephBryant, engineer. Strong, healthy man.	56. 4 months.	Has smoked for forty years; half an ounce daily for last five years, *shag* tobacco. Formerly drunk five or six pints of beer daily; for several years past has drunk only half a pint, and occasionally a little rum.	Vision, right eye $\frac{20}{200}$, and 20 J, increased to 10 J. with glasses. Left eye lost many years ago after an injury by a chip of iron. Disc in right, blue white.	Gradual failure; no pain.	Sight was excellent in right eye before the recent attack. 1870, *Oct.* 31. Says the sight is worse; sees $\frac{5}{200}$, and barely 10 J. with glasses. He wants to get compensation for an accident which has happened since he came before, and has, he says, made his sight worse.

16. 1870, May 5. F. p. 31.	Henry Lock, chairmaker. Pale, but in good health.	Not noted. 6 months.	Has smoked half an ounce daily for sixteen years *shag* tobacco. Has usually taken two pints of beer daily; has never been intemperate.	Vision $\frac{20}{100}$, and 10 J. Discs seem slightly swollen and indistinct; the outer half of each is whiter than the inner half; this difference is less marked in the right.	Gradual failure. Is rather deaf, especially on right side; has been so for several years.	1870, *August* 25. Vision 2 J.; has improved notably. Has not quite left off smoking. Has taken nothing but iron, and used a little astringent lotion for the eyes.
17. 1870, May 16. F. p. 34.	John Thornton. Spare, healthy, and vigorous; face rather florid.	60. 7 weeks.	Has smoked (sometimes chewed) half an ounce daily for twenty years *shag* tobacco. Drinks stout often when smoking, but considers himself temperate.	Vision $\frac{20}{100}$ and 14 to 16 J. Discs pale, especially at outer halves; arteries not diminished.	Says the sight failed rather suddenly, and did not get much worse afterwards. History of occasional dimness for several years, probably due to weakness of ciliary muscle. Has been to sea a good deal, and is always sick for the first two or three days.	
18. 1870, May 19. F. p. 39.	Frederick Graham, at present in a workhouse.	48. 5 weeks.	Has smoked half an ounce daily for twenty years of *shag* tobacco.	Vision 20 J.; nothing in the distance. Discs decidedly whiter at the outer than at the inner part.	He asserts that the dimness came on suddenly; as he was walking "a lot of gnats seemed to come before the sight;" he believes the sight has not got much worse since that time.	1870, *June* 23. Vision 16 J.; still nothing in the distance. *Nov.* 24. The same.

Number. Date. Reference.	Name. Occupation. State of Health.	Age. Duration of Amaurosis.	Use of Tobacco and Alcohol.	State of Eyes.	Other Symptoms.	Progress and Remarks.
19. 1870, May 26. F. p. 39.	William Doncaster.	54. 12 months.	Has smoked about half an ounce daily for thirty-five years *shag* tobacco.	Vision $\frac{20}{100}$ and 16 J.; not improved by glasses. The ophthalmoscopic changes are not far advanced. The outer half of each disc is paler than the inner half; this is more marked in the right.	Gradual failure. He was very sick when he learnt to smoke; he has been to sea, and says that he has not been sea-sick.	1870, *Sept.* 1. Vision 10 J. *Nov.* 7. Reads words of 4 J. without any glass. Still smokes a very little (half an ounce a month).
20. 1870, Oct. 3. F. p. 71.	Fredk. C. Henderson, married, a clerk. In good health.	30. 2 years.	Has smoked an ounce a week. Has never been intemperate.	Vision, with the left eye (the worse) he cannot see one's hand. Pupils of normal size, but act very sluggishly. Discs are grey-white, especially at their outer halves.	Gradual failure; sight has been as bad as now for ten months. If he smoked more than his usual quantity it made him ill.	He left off smoking a year before he applied for advice. *Note* his inability to smoke more than a small quantity of tobacco.
21. 1870, July 7. F. p. 67.	Wm. Heatley.	50. 15—18 months.	Has smoked half an ounce daily for thirty years *cavendish* tobacco.	Vision $\frac{20}{200}$ and 20 J. Discs somewhat pale, especially at the outer parts; left rather more so than right. There are slight iritic adhesions.	Gradual failure; no pain.	Had excellent sight formerly.

22. 1870, Oct. 17. F. p. 86.	John Liddle, joiner.	35. 7 months.	Has smoked two ounces weekly for sixteen years *shag and pig-tail* tobacco. Has drunk alcoholic liquors perhaps somewhat largely.	Vision, cannot count fingers at 3 feet. Discs atrophied; the left is more advanced than the right.	He asserts that his sight failed rather quickly, in two or three weeks, but without pain. He never could smoke very easily, and was always faint and sick if he smoked more than usual.	Lives a long way off, and cannot come again.
23. 1870, Sept. 5. F. p. 89.	Wm. Owen.	63. 6 weeks.	Has smoked for more than twenty years *shag* tobacco; latterly has used a quarter to half an ounce daily.	Vision $\frac{20}{50}$, and 8 J.; not improved by glasses for distance. Discs decidedly paler at the outer than the inner halves; left worse.	Gradual failure; complains of a fog.	For the last year has smoked more than he used to do; has had family troubles.
24. 1870, Nov. 14. F. p. 102.	Thos. Comery, bricklayer. In excellent health; dark hair and skin.	28. 3 months.	Has smoked more or less for twenty three years, largely for a year and a half, now quarter of an ounce daily, *shag* tobacco. Drinks freely, and often gets drunk; drinks beer.	Vision 20 J.; cannot see 200 at 10 feet. Is hypermetropic. Discs very white, margins clear; arteries little, if at all, diminished.	He gets rather giddy at times, but is not otherwise ill.	Believes present failure of sight began suddenly after exposure to the sun on a very hot day. Sight has continued to get worse ever since. Had great difficulty in learning to smoke when a boy.

Number. Date. Reference.	Name. Occupation. State of Health.	Age. Duration of Amaurosis.	Use of Tobacco and Alcohol.	State of Eyes.	Other Symptoms.	Progress and Remarks.
25. 1870, Nov. 24. F. p. 105.	Charles Hopkins, engine-driver. Married; four children, all healthy. He is in good health, pale, dark hair.	35. 6 months.	Has smoked half an ounce daily for eighteen years *shag* tobacco. Drinks a very moderate amount of beer with his meals.	Vision $\frac{20}{50}$ and 8 J. Pupils act fairly well, and are of normal size. Discs decidedly pale at the outer halves; vessels not diminished.	Very gradual failure, has been nervous lately, but has not smoked more than usual. Had no special difficulty in learning to smoke; has never been to sea.	Had very sharp sight formerly
26. 1870, Nov. 28. F. p. 109.	Israel Meyers, packing case maker. Fairly healthy-looking; head bald. Has had "rheumatism" in hand and foot; was once laid up with it.	39. 2 years.	Has smoked for eighteen years; until a year ago he used half an ounce daily, since that time only half as much, *shag* tobacco. Has drunk beer and spirits moderately.	Vision, cannot count fingers; the left is a little worse than the right. Pupils of medium size, motionless. Discs very white, sclerotic sheath plainly seen; vessels not diminished.	Gradual failure; has had no pain or inflammation in the eyes. Of late, whenever he has smoked more than usual, it has made him nervous and shaky. Had considerable difficulty in learning to smoke.	

27. 1870, Nov. 28. F. p. 112.	Wm. Packer.	40. 2½ years.	Has smoked for twenty-four years; never smoked largely, from half to three-quarters of an ounce weekly, *shag* tobacco. Has drunk beer moderately.	Vision, can just tell light from darkness. Discs very white.	His sight began to fail in August, 1868; he believes that it began to fail suddenly on a hot day, and that it afterwards became worse. Learnt to smoke with difficulty, and has always been easily made sick and nervous by over-smoking. In boyhood he went to sea on board a collier, and was not troubled with sickness.	Has been under Mr. Couper's care for a long time; he continued to get worse after he left off smoking, and has been as bad as he is now for a year and a half.
28. 1870, June. F. p. 117.	J. Lack, married, farm-labourer.	42. 18 months.	Has smoked for twenty-five years; sometimes as much as half an ounce daily, *shag* tobacco. Of late years has drunk a good deal of beer (two or three pints daily).	Vision about 16 J.; nothing in the distance. Myopic refraction. Discs in condition of white atrophy, especially at outer halves. There are also crescents, with ill-defined margins, probably advancing. Not improved for distance by concave glasses.	Sight has failed gradually. He says he could see well *in the distance*, as well as for reading, until about a year and a half ago. His sight (he says) varies a good deal, and is best in the dusk. Smoking has never disagreed with him.	It seems probable that the myopia and the atrophy of discs have to some extent advanced together. He has never used his eyes much at close work. 1870, *Dec.* 1. Sight no worse, perhaps a little better; 16 J. Has not smoked at all. Is better in health.

Number. Date. Reference.	Name. Occupation. State of Health.	Age. Duration of Amaurosis.	Use of Tobacco and Alcohol.	State of Eyes.	Other Symptoms.	Progress and Remarks.
29. 1870, Dec. 5. F. p. 125.	Wasdall Meadway, single. Has been farming, &c., at Cape and in Australia. In splendid health; light hair. Was once ill, more or less, two years ago with "liver complaint."	36. 6 months.	Began to smoke twenty-five years ago; has smoked quite regularly for eighteen years half an ounce daily; smoked a sort of roll tobacco ("Boor tobacco") at the Cape. Drinks a fair quantity of beer, and some gin.	Vision $\frac{20}{200}$ and 12 J.; not improved by glasses. Discs decidedly paler at outer third; vessels of good size.	Gradual failure. Learnt to smoke easily; it never disagrees with him, or makes him nervous. Is a good sailor.	

SUMMARY.—The five worst cases are, 20, 22, 24, 26, 27. In each the patient had been a *smoker for a long time* (average 19¼ years, excluding No. 20, in which this item is not given). In several of them (excepting 24 and 26) the *quantity of tobacco smoked had been comparatively small.* The quantity of tobacco used by the two patients whose sight was worst of all (Nos. 20 and 27) was less than that used by any other patient. The *duration of the amblyopia* in these severe cases was (with the exception of No. 24) considerable, the average (excluding No. 24) being 21¼ months. There were *other signs of intolerance of tobacco* in the same five cases. Only one other case (No. 6) is noted as having suffered any other unpleasant symptoms, and these were apparently slight. In all the worst cases the patients had used alcoholic drinks, and two of them had been great drinkers.

In the *worst case of all* (No. 27) the patient had smoked very little compared with most of the others; he had had difficulty in learning to smoke, and smoking had often in after-life made him sick and nervous. He had smoked for 24 years. According to his statement, his sight continued to get worse after he left off smoking, but as he did not come under my care until his amaurosis was almost absolute, I cannot verify his assertions on this point.

CASES SELECTED FROM OPHTHALMIC PRACTICE.

By Christopher J. S. Jeaffreson (of Newcastle-on-Tyne).

Case I.—*Case of Congenital Malposition of the Lens in each Eye.*

J. F., æt. 18, applied to me on account of her eyesight. She is a dull, unintelligent girl, unable to read or write, and engaged as a general servant. She complained of confusion and indistinctness of sight, with occasional diplopia. These symptoms, she says, are aggravated in the dusk of the evening. She has never suffered from inflammation of the eyes, nor pain, and has never ailed in any way with the exception of her eyesight, which has been the same as long as she can recollect. At times she feels as though there were something alive and moving in the eye. On examination, the eyeballs were found to be somewhat smaller than usual, the anterior chambers shallow, pupils contracted but active, tension normal, $V = \frac{12}{cc}$ for distant objects; for near $\frac{1\frac{1}{2}}{XX}$, but owing to her stupidity it was impossible to get a perfectly accurate statement of the acuteness of vision. A + 5, she says, much improves her sight, especially when placed in front of the right eye. On carefully examining the pupils, the right appeared dark and unobstructed, but towards the nasal margin of the left, although it was dark and transparent, there was a peculiar golden line of reflections, which immediately suggested a displacement of the lens. The pupils were now dilated at maximum, when, by aid of oblique illumination, the following condition was found:—Both lenses, though perfectly clear and transparent, were displaced towards the nasal side of the eye, that of the right was more displaced than the left; so internally was it situated, in fact, that it was completely covered when the pupil was contracted. Varying the position of the patient's head did not appear to move them, and, as far as I could ascertain, they were immovable. The result of an examination with the ophthalmoscope was very peculiar, for when the portions of the fundus, viewed through the lens, were clearly defined, the remaining portion of the fundus not being in the same focus,

appeared blurred and indistinct. The optic discs presented no symptoms of disease, and the rest of the deep structures of the eye appeared normal.

I thought it inadvisable to operate in this case, as the vision was sufficiently good for most of the purposes of the girl's life.

Wecker advises an irridodesis to be made in the direction that will bring the pupil opposite that portion of the fundus which is unobstructed by the lens, thus placing the case in the position of one which has had the lens extracted. As regards the right eye in my patient, the extract of calabar bean could always keep the pupil sufficiently contracted to cover the lens, and yet vision was by no means perfect with the use of a convex; and I argued from this that an operation would, in all probability, be unsuccessful in the other eye, and that a certain amount of amblyopia due to the reception from birth upon the retina of confused and imperfect images, would remain. The fact of vision being more indistinct in a subdued light explains itself without comment.

Case II.—*Case of Erectile Tumour in the Orbit.*

C. M., æt. 14, a pale, delicate-looking lad, was brought to me on account of a protrusion of the ball of the left eye. The history his mother gave of the case was, that a very slight protrusion had existed at birth, and that with the growth of the child this had gradually increased.

The condition was as follows:—

The eye was displaced forwards and somewhat upwards to such an extent that the lids, which were rather œdematous, could not close over it. The tunics were much injected, the pupil sluggish, and vision reduced to the perception of large objects only. The movements of the eye were perfect, and there was no pain nor tenderness, but occasionally a slight aching and feeling of tension. The floor of the orbit seemed occupied by a swelling, which was deeply situated, had a hard and somewhat elastic feel, and, when pressure was made upon it, it yielded somewhat as though its calibre were diminished, or it slipped back into the orbit. At first I thought it was a deep-seated cyst, but a free puncture being made, no fluid escaped, and I came to the conclusion it was a solid growth. I recommended an operation, in

which the parents readily acquiesced. An incision was made in the conjunctiva below the globe of the eye and the whole length of the commissure; the tumour was readily reached. It was found to be large, extending deeply into the orbit, and surrounding the optic nerve.

I now found it necessary, to enable me to work with more facility, to enlarge the incision by dividing the external canthus, for the tumour was evidently of considerable size, and the hæmorrhage had become somewhat alarming. The growth had no connection with the bones, from which it was easily separated, and the whole mass, together with the eyeball, was rapidly enucleated. The socket was now firmly plugged with lint dipped in a solution of perchloride of iron. The boy though somewhat reduced by hæmorrhage at the time, afterwards made a rapid recovery.

The tumour was carefully examined by Dr. Philipson and myself.

It was firmish in texture, somewhat lobulated, and inclosed in an ill-defined capsule. Upon section, its structure appeared reticulated and spongy, and was found to consist of a large quantity of blood-vessels connected by condensed cellular tissue. In fact, there could be no doubt that the tumour was a vascular (erectile) one, which by its growth in a confined situation had been subjected to so much pressure as to result in its partial condensation.

CASE III.— *Absolute Amaurosis with Loss of Smell and Taste.*

E. G., æt. 38, a female who recently came under my notice, gave the following history of her complaint, which was verified by her former medical attendant. Two years ago, whilst in the enjoyment of perfect health, she began to feel a kind of uneasiness in the region of the frontal sinuses; by degrees a swelling developed there, and she became liable to epileptic fits, and gradually her power of smell left her. Towards the end of one year from the first appearance of the swelling, the epileptic seizures became very frequent, and during one of unusual severity a copious discharge of matter took place from the nostrils. On recovering from this attack, she found herself absolutely blind,

and unable to distinguish the taste of anything which was put into her mouth; but coincidently with this discharge, the fits left her, and have never reappeared since.

It is now twelve months since the blindness supervened, and the optic discs were found large, pale, and atrophied, and the retinal vessels much diminished in calibre. She is unable to distinguish the odour of any substance, but thinks the taste has slightly improved, as she can tell a strong acid when placed far back upon the tongue.

CASE IV.—*Double Glioma (?) of the Retinæ. No Operation.*

J. R., an infant, 12 months old, was brought to me for examination. He is a healthy looking child with fair hair; there is nastygmus and alternating strabismus. The pupils are midway between contraction and dilatation, and perfectly inactive. The anterior chamber is obliterated by the bulging forward of the lens, there is a faint sclerotic zone of redness, the tension of the eye is somewhat diminished, and the mother thinks the globes are not so large as formerly: from the fundus of each eye there is decided yellowish-white reflexion. I made repeated attempts to examine the eyes with the ophthalmoscope, but owing to the restlessness of the child and the fact that atropine exerted no influence upon the pupil, I was not able to succeed until chloroform had been administered.

Oblique examination showed the lenses to be clear and transparent, and with the ophthalmoscope a nearly white substance was seen projecting into the vitreous, which must have been in a great measure absorbed. The substance of the growth was smooth and almost of milky whiteness, and no traces of vessels were visible. The condition was almost identical in either eye, but in the right the tumour appeared to approach nearer to the lens.

The history of the case was as follows: A few months after birth the mother observed a cast in the right eye, but thinking it was nothing particular they took little notice of it. By degrees, however, they saw the child was less observant of things, and was constantly desirous of rubbing the eyes; nastygmus gradually supervened, and now the child seems totally blind, and

will lay for hours pressing his little hands against his eyes. The child's general health is good, and the mother does not think he suffers pain, although from his constantly rubbing and pressing the globes, there must be some feeling of uneasiness. The proposal I made to the mother that as a last resource both globes should be enucleated was rejected.

Case V.—*Foreign Body Lodged in the Orbit.*

E. D., a lad of 13, presented himself with a small cystic tumour at the corner and inner margin of the orbit, the skin over it was smooth and of natural appearance, but the tumour was so closely adherent, that it seemed impossible to remove it without sacrificing some portion of integument. The boy says that some months ago whilst running, he struck his head against a tree, and that soon after the tumour began to develop without pain or inflammation. It is now about the size of a large filbert. I made an incision into the cyst, and turned out its contents, which proved to be thick curdy pus. This led to the idea that a foreign body might be lodged in the orbit; search was made, but none could be found; a lint was introduced to induce the cyst to granulate from the bottom. About ten days after, my partner, Mr. Fife, observing something black projecting in the wound, removed it, and found it to be a splinter of wood almost an inch in length and the thickness of a small pen-holder. The boy did well.

Case VI.—*Curious Case of Traumatic Cataract.*

A lady brought her son, æt. 8, to me with a well-marked cataract of the right eye. The lens was perfectly opaque and somewhat swollen, and had very much the appearance of a congenital cataract. The history given of the case was that four months ago the boy had a slight inflammation of the eye which lasted a few days, and shortly after that the cataract began to form. I dilated the pupil and proceeded to examine the lens carefully with oblique illumination, when I found a dark black looking line occupying the lower and inner part of the periphery of the lens. This was soon discovered to be a portion of a needle,

and after diligent search the small scar was found where it had penetrated the cornea. The child, who seemed to have a wholesome dread of punishment, denied all knowledge of the affair. I purpose in a few days removing the lens and foreign body.

CASE VII.—*Foreign Body in the Eye.*

A child was struck in the eye with the lash of a whip; sight was almost immediately lost, but very little inflammation followed. Six months after I saw the child, the globe was slightly shrunken, the pupil active, the lens somewhat opaque. On dilating the pupil, a dark line was seen descending vertically across the back of the lens, dividing the field into two equal lateral portions. On everting the upper lid and directing the girl to look as much downwards as possible, I found a small piece of something still projecting through the sclerotic. I seized it, and withdrew from the globe a piece of stout copper wire fully an inch in length. It was afterwards discovered that the lash of the whip with which she was struck had upon its end a piece of wire. Loss of sight was complete.

CASE VIII.—*Detachment and Extrusion of the Lens and Iris following a Rupture of the Eyeball. Good Vision remaining.*

H. W., æt. 45, struck his eye against the sharp corner of a table; the blow was productive of great pain, and shortly after he presented himself to me. The whole of the anterior chamber was filled with blood, and a small rent was found in the sclerotic at the lower and inner corner close to its junction with the cornea. Nothing protruded from the lips of the wound, and the globe was not much shrunken. It was impossible from the effusion of blood to come to any conclusion as to the amount of mischief done.

This patient was lost sight of for four months, when I again saw him and exhibited the case at the Northumberland and Durham Medical Society. The cornea was perfectly clear. The iris entirely absent, and not a trace of the lens remaining. Oblique illumination shows a small white speck about the size of a pin's head upon the anterior surface of the hyaloid membrane.

With the ophthalmoscope the vitreous was found perfectly clear and transparent; there was highly marked hypermetropic refraction, such as we see after cases of cataract extraction; the fundus appeared healthy. V with $a + 5 = \frac{20}{XL}$ for distance. For near objects, $V = \frac{2}{5\frac{1}{2}}$ with $+ 2\frac{1}{2}$.

Another curious point in connection with this man, though not bearing upon his present symptoms, was that some fifteen years ago he was trephined for epilepsy (as far as I can make out) by the late Sir John Fife, and apparently with success. The circular aperture is distinctly felt in the centre of the left parietal bone.

CURATOR'S PATHOLOGICAL REPORT.

By Edward Nettleship, F.R.C.S., Curator to the Hospital.

In the following account, the arrangement originally adopted by Mr. Bader for the specimens in the Ophthalmic Hospital Museum has been followed. Eyes marked * have been preserved in the Museum; those to which a † is affixed were not obtained from patients of the Hospital. The account includes most of the eyes removed between May 1st and July 1st, 1871.

Eyes Lost by Injury.

† 1. *Wound in Ciliary Region—Foreign body embedded in Eye—Excision on fifth day—Purulent Iritis—Cell Proliferation of Cornea—Recent inflammatory changes in Superficial Layer, and to a less extent in deep layer of Choroidal Stroma—Disorganization of Retina—Suppuration of Hyaloid—Lens healthy.*

Mr. A., æt. about 40, patient of Mr. Hutchinson's. Five days before excision his right eye was wounded by a chip of metal; an unsuccessful attempt was made by a surgeon the same evening to remove the chip. The eye had on several previous occasions been inflamed and painful, and a surgeon had suspected the presence of a foreign body some time before. There was a wound in the ciliary region, involving also the margin of the cornea, with prolapse of iris, but no foreign body could be found by Mr. Hutchinson when he saw the patient the day after the accident. The cornea and iris inflamed, the latter producing pus in abundance. On cutting open the globe, a chip of iron $\frac{1}{8}$ in. long, thin, sharp, and quite clean, was found imbedded in the sclerotic, close to the corneal attachment; it corresponded in position with the wound, but was hidden. It was quite loose. Some of the structures were examined after hardening for a few days in chromic acid. The iris was covered by pus, and swollen; it was not examined microscopically. Cornea considerably thickened; no anterior epithelium seen in vertical sections; corneal corpuscles enormously enlarged by proliferation of nuclei, each

nucleus seeming to have produced from about half a dozen to upwards of fifty new inflammatory corpuscles. Posterior elastic lamina normal. Posterior epithelium not seen, but its place occupied by a layer of dark, finely granular and fibrous material, of somewhat greater thickness than the elastic lamina; this was probably fibrinous exudation from the iris or cornea. Lens, transparent. Choroid, its epithelium almost entirely absent; elastic lamina normal. Superficial layer of stroma (chorio-capillaris) much thickened, highly granular, and infiltrated with ill-defined recent inflammation corpuscles. Deeper, pigmented, layer of stroma showed the pigment cells to be normal, but there was considerable corpuscular and granular infiltration; the structures of this layer were also remarkably and irregularly opened out, or separated from one another, so as to present, in vertical sections, numerous large circular spaces of various sizes, bounded by the stellate pigment cells and inflammatory products. These spaces were probably filled with fluid, the result of inflammatory œdema. Retina, detached everywhere except at the ora serrata and optic disc, the attachment to the latter being only very slight. Retina and hyaloid together formed a thick œdematous, soft, semi-opaque membrane, in which none of the retinal elements were with certainty recognised. The hyaloid membrane was suppurating freely, being covered with numerous pus corpuscles, which, even where most sparingly present, gave it the appearance of a very thickly nucleated young tissue. There were some brood capsules. None of the new cells had begun to develope into connective-tissue forms.

† 2. *Blow on the Eye—Suppurative Cellulitis of Orbit—Hypopyon—Excision on seventh day—Recent Optic Neuritis and Œdema of Retina.*

William Felton, æt. about 35, received two severe blows on the left eye and neighbouring parts, at an interval of about four days. The second blow was followed rapidly by great swelling, and in a few days by diffuse suppurative cellulitis of the eyelids and orbit, in appearance just like erysipelas. He had not been exposed to contagion of erysipelas, and it was stated that the blows did not produce any wound. Free incisions into the lids

were not followed, after several days, by any diminution in the severity of the symptoms; these were exophthalmos, hypopyon, all but total blindness, considerable constitutional disturbance, and for the first few days great pain. Excision performed on the seventh day after second accident. Cornea partly opaque; large hypopyon. Iris not examined. Lens and vitreous looked healthy. Optic disc swollen, white and "woolly," the vessels being partly buried: retina everywhere spotted over with small patches of whitish semi-opaque appearance, as if œdematous, this change being especially marked near the y. s.

The disc and neighbouring retina were carefully examined. The large blood-vessels remained distended with blood after hardening in chromic acid solution. Numerous white blood corpuscles adhered to the inner coat of the vessels, and just where the vessels began to dip into the physiological cup large lymph-like corpuscles were observed immediately outside their walls. These corpuscles were for the most part larger than the white blood cells from which they were separated by the walls of the vessels, some of them much larger. They were generally oval, and each contained a single round or roundly oval nucleus about as large as a red blood corpuscle. In the nerve-fibre layer near to the disc there were also changes probably indicative of infiltration with albuminous fluid. The nerve-fibres were slightly granular and less regular in outline than those of a similarly prepared healthy eye. In thick sections there were appearances resembling oval, thin-walled cells distributed among the nerve-fibres, but in teased-out specimens these were seen to be really oval spaces between the nerve-fibres. They were not cells, for they could never be isolated from the nerve-fibres; neither were they swellings on the nerve-fibres, for they were never seen associated with only one fibre, but always between two or more. They were considerably larger than the ordinary varicose swellings of the nerve-fibres; their outlines were thin and highly refracting and their interior clear. Such appearances might probably be produced by effusion of albuminous fluid between the nerve-fibres, and subsequent coagulation of its solid part around small drops or globules of the watery portion. It is very likely that the preservative fluid had something to do with the production of these cell-like appearances.

Sections of the choroid showed its larger vessels distended

with blood, but no other changes were noticed. I did not make a prolonged examination of this coat.

3. *Blow on the Eye—Hæmorrhage between Sclerotic and Choroid—Suppuration of Choroid and probably of Retina and Vitreous—Sloughing and Perforation of Cornea—Blood-clot beginning to suppurate—Excision three weeks after accident.*

Eliza Nightingale, æt. 50, under Mr. Couper's care. Her right eye was struck by a hammer one week before admission. The eye was said to have been quite blind immediately after the accident. Latterly it had been very painful. She refused excision at first, and the eye was not removed until three weeks after the accident. At the date of operation there was much inflammatory œdema of the lids and conjunctiva; the cornea had in great part sloughed, the remainder being opaque and yellowish; the eye burst during enucleation. It was opened the next day (not having been put into any solution) by an antero-posterior section. The lens was absent. Neither retina nor vitreous could be detected, the place of these parts being occupied by yellowish semi-fluid, somewhat flabby puro-lymph. The choroid was separated from the sclerotic, in some parts widely, by a soft red succulent fibrous-looking substance. This succulent fibrous-looking material also infiltrated the substance of the choroid itself so that it was not always possible to be certain where the choroidal outline ran. The ciliary processes were separated from the sclerotic by similar material, but their characteristic black outline remained sharply defined. The new material consisted of—1st, a close arrangement of fine fibres quite distinct from each other, running for the most part in straight lines, and forming irregular bundles, which crossed each other at various angles; 2nd, crowds of lymph-like corpuscles of various sizes. Precisely similar elements were found mingled with the choroidal stroma in the ciliary region. In some places there were masses of purely corpuscular structure indistinguishable from pus. Some altered blood pigment masses were seen in parts.

*4. *Rupture of Eye, two Months—Displacement of Lens into Vitreous Space—Detachment of Retina—Bleeding between each of the Coats and at normal position of Lens, &c.—Commencing Colloid Degeneration of Choroid with Atrophy of its Stroma.*

Peter McK., æt. 46, came under the care of Mr. Wordsworth on account of his right eye. It had been intentionally "gouged" by another man with his thumb or a stick eight weeks before. Sight was immediately lost, and the eye had been painful ever since the accident. The eye was found on inspection to be somewhat smaller than the other, with T —, much congestion and great pain. The cornea was slightly hazy and the iris in contact with it. He had bare perception of light with the eye. Excised on the day of admission. Hardened in chromic acid for a week. Globe much puckered, the chief indentation forming a somewhat deep groove running round the eye at the equator; several less marked contractions ran into this one from the front. Just behind the internal rectus was a deeper pucker, to which the external tissues were very firmly adherent. A horizontal antero-posterior section was made passing across the last-mentioned part, and showing that it was the scar of a wound of the sclerotic; the wound had probably been half an inch long. The edges of the ruptured sclerotic were turned inwards and away from one another, and were distinctly thickened and club-shaped. The sclerotic around the optic nerve entrance was much thickened. The wound was filled with a small plug of tough brownish substance. Similar material filled the whole ciliary region and the position of the lens; the edges of this mass were thicker than its centre, so that it formed a biconcave disc in the place of the lens and ciliary processes. The iris was slightly curved backwards. This substance was in parts spongy and porous. It consisted of a fibrinous basis, containing sparsely scattered lymph-like corpuscles and many spherical yellow-brown pigmented masses of various sizes. There were no signs of either fatty degeneration or transformation into fibrous tissue.

Retina detached, except at the optic disc; the space between retina and sclerotic on the inner side (towards the wound), filled with firm fibrous-looking material, something like that in the front of the eye, with which it was continuous at the position of the wound. The outer part of the space between retina and

choroid filled by bloody fluid and partly decolorised clot. Vitreous space contained blood partly decolorised, and lying at its lower part was the transparent lens in its capsule, its posterior surface looking upwards.

The choroid was not distinguishable on the inner (wounded) side; at the outer side it was *in situ*, and looked healthy to the naked eye. On minute examination it showed, however, irregular distribution of the epithelial cells with alterations of their form; small, highly refracting, sharp outlined hemispherical projections from the elastic lamina, and an abnormally fibrous appearance with deficiency of cells in the chorio-capillaris.

The optic nerve was much wasted, especially at the scleral ring, where it appeared constricted by the thickened sclerotic. The cornea was blood-stained; anterior chamber, deep, but of good form.

*5. *Punctured wound of Eye—Detachment of Retina—Hæmorrhage between Choroid and Retina, and into Anterior Chamber —No Lens—Excision 3 Months after wound.*

Winnifred Sawyer, æt. 10, Mr. Hutchinson's patient. Her right eye was punctured by scissors 3 months before admission. When she applied the lost eye was very painful and tender, cornea hazy and prominent, anterior chamber full of blood. The other eye was irritable. Excision was performed 4 days after admission. The globe was found to be considerably shrunk and misshapen, the cornea being excessively prominent, while the vitreous chamber was flattened from before backwards. After a month's hardening in strong spirit, an antero-posterior section was made. The eye had shrunk slightly more while in the spirit. A very marked puckering and indentation was noticed at the front part of the sclerotic, and probably marked the seat of the wound. No trace of lens was found. The situation of the posterior capsule was marked by a small patch of very firm white tissue. The iris was not identified, but was probably represented by a thin dark line at the back of the cornea. The anterior chamber and position of lens were entirely occupied by a firm dark-red uniform clot of blood. The retina was detached (except at the disc), and as far as the equator; it was shrunken, opaque, and yellow, and formed a conical mass of soft, solid

tissue, containing no vitreous space. In structure it consisted of a whitish soft substance, having a slightly fibrous appearance, and easily splitting or tearing; it was composed of overgrown retinal fibrous tissue, together with very beautiful long nucleated spindle-cells, mixed with large numbers of round lymph-like cells, probably derived from the granular layers; there were no signs of fatty degeneration. The space between retina and choroid was large, and filled by flocculent greyish and yellowish material, in parts blood-stained, but nowhere simple blood-clot. It consisted of granular matter, with numerous large compound granule cells. It was probably partly decolorized and degenerated blood-clot. It adhered slightly to the choroid in many places. The optic nerve at its entrance was small. The choroid looked too thick, but this was probably from shrinking; its epithelium looked normal, and with a hand lens no trace of colloid degeneration could be seen. The choroid was drawn forwards at the optic disc by the displaced retina, and at the equator it, as well as the sclerotic, was drawn inwards towards the hyaloid fossa.

*6. *Blow on the Eye*, 16 *Years—Quite Blind*, 11 *Years—Frequent Attacks of Pain—Blow near the Eye*, 1 *Month—Eye Shrunk—Absorption of Lens—Detachment of Retina—Atrophy of Choroidal Stroma, with Inflammatory Changes and Colloid Disease—Vessels in deep layers of Cornea.*

Fredk. W. M., æt. 50, Mr. Critchett's patient. His left eye was struck by a round piece of wood 16 years before excision; sight was immediately much impaired, but was not totally lost for about 5 years; the eye had been quite blind for about 11 years. He had had several attacks of pain since the accident, and the lost eye had almost constantly been "blood-shot." For 2 or 3 months previous to excision the eye had given him a good deal of pain, and this had become worse after a blow on the left eyebrow (? on the blind eye) 1 month before. Before excision the eye was very soft, appeared smaller than the other, and was quite blind. It was much congested, and the cornea was also very vascular and uniformly semi-opaque. The right eye was irritable, but not inflamed, and its vision good.

After removal the sclerotic was somewhat shrunk, and squared,

and there was a shallow groove running round the eye at the equator. The optic nerve was wasted and pinkish. After soaking for 4 days in glycerine and diluted spirit, it was divided vertically in the antero-posterior direction into unequal halves. The cornea contained many small blood-vessels. None of them were on or near to the anterior surface; the largest (the trunks) were at or perhaps rather in front of the middle layers, while the smaller and much more numerous ones (branches) occupied the deepest corneal strata, some being close to the posterior elastic lamina. The anterior epithelium and both elastic laminæ were normal. There was no obvious proliferation of the corneal corpuscles anywhere.

The sclerotic was irregularly thickened. The lens was absent, its capsule being thickened and opaque, and the anterior and posterior layers in apposition, but not adherent to each other. The retina was detached in the form of a hollow cone, with its apex at the disc, and its base at the ora serrata; it was shrunken, semi-opaque, and enclosed only a very small vitreous space, the fluid of which was not separately examined. The retina consisted of its connective-tissue and granular elements only; some of its fibres were fatty; it contained many blood-vessels. The large sub-retinal space was filled with thick chocolate-brown fluid, containing many darker reddish flocculi, which sank to the lowest part. The fluid and flocculi consisted of fine molecules, oil-globules, large spherical coarsely-granular cells of yellowish-brown colour, and pigmented granule masses. The choroid was in contact with sclerotic everywhere, and not thickened. Its epithelium was disturbed so as to form innumerable small islands, consisting of pigmented globular or oval masses as large as several cells put together, and frequently showing a clear space in the centre like a large nucleus. The elastic lamina was normal in most parts, but occasionally showed enlargements which disturbed its normal outline (commencing colloid bodies). The stroma in most parts contained no stellate pigment. It was composed chiefly of fibrous-looking tissue which had undergone considerable fatty change, and numerous round corpuscles as large as white blood-cells, and most numerous in the chorio-capillaris; some of these were in all probability blood-corpuscles, but the great majority were too evenly distributed and too far apart to admit of this explanation. There was no bone. The

iris was thin, shreddy, devoid of pigment, and adherent to the anterior lens-capsule.

7. *Eye wounded*, 11 *Years — Much Shrunken — Lens Chalky — Ossification of Choroid—Detachment and Fibrous Degeneration of Retina.*

Thomas Falahee, æt. 18, a patient of Mr. Critchett. His left eye had been lost 11 years before excision, by a wound with a fork. It had not lately given him any trouble, but he fancied it might injure the sound eye. The lost eye was very small and felt hard; the cornea was opaque and showed a linear scar. When examined the sclerotic was found much puckered and thickened. The choroid was extensively ossified on its inner surface, the bone forming an irregular plate passing from close to the optic nerve entrance forwards to the ciliary region; a band, including somewhat more than a third of the whole choroid, was thus affected. The bone was thickest near the optic disc, and from the thickest part spiculæ projected into the yet unossified parts; it did not surround the optic nerve completely. The lens was represented by its nucleus, which was of normal shape, yellow colour, and stony hardness; fragments showed no definite structure; they effervesced strongly with nitric acid. The retina consisted of a buff-white soft fibrous mass, showing no membranous arrangement, and enclosing no cavity; it consisted wholly of definite rather fine fibres, and very long fibre-cells, containing oval nuclei, or oval central bulgings; there were numerous small blood-vessels, most of which were in an extreme state of fatty degeneration; there was a moderate amount of free granular matter, but no round cells. The ciliary processes and iris were represented by tough, black tissue, adherent to the nucleus of the lens.

8. *Eye lost many years—Shrunk—Plate of bone in Choroid around Optic Disc—Colloid disease of Choroid—Detachment of Retina with calcification of its vessels—Old Cyclitis—No Lens—Sympathetic Ophthalmitis of other Eye.*

Anne Warr, under Mr. Critchett's care. Her left eye was lost many years before excision, but the nature of the

accident was not ascertained; recently the right had become sympathetically inflamed. The left eye at the time of excision was much shrunken and puckered, one groove especially marked ran transversely across the front of the eye. Remains of cornea clear. It was dissected the same day. There was no trace of a lens. The choroid at the back of the eye contained a large thin plate of bone which surrounded the optic nerve completely. The rest of the choroid was thickly dotted with "colloid" bodies which were visible to the naked eye, and looked like grains of fine sand; under the microscope they were seen to be still covered more or less by mis-shapen epithelial cells. The retina was partly detached, remaining attached at the optic disc; it had undergone extensive fatty changes, and some of its larger vessels showed much calcareous degeneration, and effervesced with nitric acid. The vitreous was quite fluid, and contained much cholesterine. There was a good deal of opaque white deposit at the back of the ciliary processes.

9. *Eye lost by (?) wound, 7 Years—Shrinking and Fibrous Degeneration of Choroid—No Bone.*

John Anderson, 65, a patient of Mr. Lawson's, was admitted on April 18, 1871, on account of a sloughing ulcer with hypopyon of his left cornea, from an abrasion. The right eye had been lost seven years before by an accident, probably from the history, a wound by a stone. The lost eye was much shrunken, and the cornea was barely distinguishable. In June it became painful, and was excised. When opened, the choroid was found to be separated from the sclerotic. Neither retina nor lens could be detected, the space inside the choroid being filled by very firm (occasionally gritty) white fibrous scar-like tissue. There was no bone.

10. *Blow on a previously Blind Eye—Rupture of Sclerotic and escape of Lens beneath Conjunctiva—Little pain—Excision on the 6th day.*

Mary A. Webb, 47, patient of Mr. Streatfeild. She applied on account of a recent accident to the left eye. The same eye had been blind for 12 years from iritis. Five days before excision

she struck the eye against the projecting inverted leg of a table; the accident had not been followed by much pain. Before excision the cornea was clear. Pupil blocked by old lymph, and presenting some recent reddish specks; pupil displaced upwards somewhat as after a free iridectomy, but ciliary margin of iris invisible at upper part by reason of overlapping œdematous conjunctiva. A large oval swelling beneath conjunctiva at upper part, of purplish colour, and not tender. During excision the transparent lens escaped from beneath the prominence mentioned, and the globe collapsed. A large rent was found close to sclero-corneal junction. Retina torn away from the optic disc and detached almost everywhere. Choroid near to optic disc rent in several places, quite movable and not at all adherent to sclerotic at the torn parts; the torn edges had retracted, and left a considerable patch of sclerotic bare; choroid looked normal to the naked eye.

11. *Eye injured (? wounded) by a Gun-explosion, 4 Years—Eye shrunk.*

J. Alcock, 26, under the care of Mr. Couper. Four years before excision his left eye was "blown out" by a gun-explosion; a piece of gun-barrel as large as the nib of a pen was stated to have gone into the "corner of the socket," and to have "turned the eye out." He had no sight with the eye after the injury. Excised on May 26, 1871. Left globe very much shrunken and puckered; no cornea. On section, only sclerotic and choroid recognised. No bone. Sclerotic much thickened. Optic nerve shrunken so as to leave a large space between itself and its sheath. No foreign body found.

12. *Hæmorrhage between Sclerotic and Choroid, and probably into Anterior Chamber—Shrinking of Eye—Probably lost by a Wound.*

An eye removed by Mr. Bowman. Much shrunk. Cornea small and partly opaque. The choroid was found detached, and forming a hollow cone which contained the retina. Choroid degenerated on its inner surface into white, firm, tough fibrous tissue containing many fine granules. No lens. Much soft fibrous-looking structure in position of lens, and adhering to

posterior surface of cornea (not microscopically examined). Between choroid and sclerotic brown thickish opaque fluid containing a large quantity of cholesterine.

EYES LOST BY SYPHILIS.

13. *Interstitial Keratitis—Peripheral Choroiditis—Glaucoma—Inflammatory Sub-retinal Effusion—Equatorial and Ciliary Staphyloma not involving the inner layers of the Retina—Iridectomy (date unknown)—Lens shrivelled—Other signs of Inherited Syphilis.*

Benjamin S., æt. about 35, Mr. Streatfeild's patient. His eyes had been first inflamed at the age of 5 years. At the date of admission his right eye had for 10 years been as defective in regard to sight as it then was; latterly it had been inflamed and painful. The condition of the right (excised) eye was as follows. The cornea was opaque all over, the opacity being specially dense and yellowish-white near the centre. The pupil was quite occluded, and the iris almost in contact with the cornea. There was a commencing scleral staphyloma, forming an anteroposterior band about $\frac{1}{3}$ inch wide at and in front of the equatorial region; it did not bulge much, but the coats appeared by transmitted light to be considerably thinned. In the left eye (examined after excision of the right) the cornea was nebulous, probably from past interstitial keratitis. The patient's central upper incisors were notched in a manner quite characteristic of inherited syphilis.

The globe was hardened in chromic acid and divided into an anterior and posterior half. The sclerotic looked normal, except at the staphyloma, where it was much thinned. The choroid was everywhere in apposition with the sclerotic. It was examined minutely only at and near the staphyloma. The epithelium was disturbed, its cells irregular in shape and size, and the pigment granules irregularly distributed. Its stroma was thickly strewn with fine granules. At the staphyloma it was thinned out, and its stellate pigment cells atrophied.

Between choroid and retina was a thin, irregularly distributed layer, deficient in many places, of granular whitish material, containing small, free, oval, and round cells, imbedded in a finely granular matrix; the granular matrix was no doubt albuminous fluid, coagulated by chromic acid.

The retina was, with the above exception, *in situ*, and even over the thin layer of subretinal effusion it was not raised perceptibly to the naked eye. The retina followed the abnormal curve of the outer coats at the staphyloma only with its outer layers, its inner layers retaining their normal curvature. Thus, opposite the bulging portion of the sclerotic and choroid the retina was thickened to the extent of nearly $\frac{1}{20}$ inch at the deepest part of the staphyloma. With the naked eye, and better when magnified, its structure could be seen at this part to consist of bands or pillars of semi-transparent tissue, stretching between its opposite surfaces. Examined with higher powers, it was found that the internal and external limiting membranes were well preserved, and indeed hypertrophied, and that between them stretched pillars formed of numerous sharply-defined, stiff, nearly parallel fibres. The fibres composing each pillar diverged at its outer and inner ends, and became split up into very numerous fine filaments, which passed into, and formed the two limiting membranes. These pillars were therefore the fibres of Müller, immensely overgrown both in length and number. Neither nerve layer nor rods and cones were present. The granular layers, however, could easily be recognised, more especially the outer granular layer. The granules of these two layers were scattered about among the diverging fibres of the hypertrophied Müllerian pillars, close to the inner and outer limiting membranes respectively. In some cases, granules of the outer layer could be seen passing inwards for a considerable distance among the fibres of a pillar. Occasional circular spaces were formed in the Müllerian pillars by the divergence of their constituent fibres. Viewed from the outer surface, the external limiting membrane was seen to be perforated by numerous large holes, or rather, it seemed to be composed of a network of fibres with round meshes of large dimensions (an exaggeration of the normal appearance). The retina in the neighbourhood of the staphyloma had all its layers well preserved, if we except the nerve-fibre and nerve-cell layer, which were ill marked. The optic disc was deeply cupped up to its margin.

DOUBTFULLY SYPHILITIC.

* † 14. *Eye inflamed in infancy—Later, Iritis—Great enlargement of Anterior Chamber—Slight bulging of Sclerotic—Detachment and Fibrous Degeneration of Retina—Inflammation with great Œdema of Choroid, Ciliary Muscle, and Suspensory Ligament—Fibrinous Cyst on Inner Side of Choroid—Highly albuminous Character of Fluids in Anterior Chamber and Sub-retinal Space.*

Mr. ——, æt. 19, Mr. Hutchinson's patient. In infancy he suffered from a severe eruption, the nature of which was uncertain, and at the same time one eye inflamed badly. There were no other facts in the patient's family history, nor any other symptoms in himself leading to a suspicion of inherited syphilis. All history of injury was denied. Recently the eye had become painful. After removal, the T. was —. The cornea appeared enlarged in every direction, and measured more than $\frac{1}{2}$ inch in its widest diameter. A linear transverse opacity, attended by slight puckering, occupied the central half of its width, and two denser spots were present at the centre of the linear opacity and at its end respectively. The sclerotic was squared, probably from bulging between the recti. The aqueous was clear, and the iris greenish. The pupil was closed by a thin membrane. After hardening for four days in chromic acid the eye was divided into anterior and posterior halves, and the front half again bisected from before backwards.

The sclerotic was somewhat thickened at the line of section, but showed nothing else noteworthy to the naked eye. The cornea was a little flattened at its centre, but seemed to spring by a sharper curve than usual from the sclerotic. The anterior chamber was very deep, and measured $\frac{1}{9}$ inch at its deepest part. It contained coagulated albuminous fluid, without any inflammatory corpuscles. The iris was somewhat bulged forwards at its central part, and by this means the anterior chamber became of nearly equal depth in all parts; the iris was in contact with the lens. A fibrous membrane, containing many inflammation corpuscles, stretched across the pupil. The lens was slightly shrunken, flattened on its posterior surface, and opaque. Its anterior capsule was normal, but the superficial layer of lens substance was fibrous looking and granular when examined with the micro-

scope. The retina was detached in the form of a cone, its apex being at the optic disc, its base blended with fibrous thickening at the back of the ciliary processes and hyaloid fossa; it was much thickened, and enclosed no appreciable amount of fluid. It consisted solely of the fibrous and corpuscular elements of the retina. The space between choroid and retina was filled by curdy, granular, whitish material, which became transparent and viscid in solution of soda, and was probably albuminous. It contained numerous cholesterine plates, and many small needle-shaped crystals. The granular material consisted in some parts of minute structureless particles, in others, of highly refracting globules, adhering to each other in heaps, and reminding one somewhat in appearance of the calcareous concretions in the pineal body: the globules were never, however, arranged in regularly spherical masses. They did not dissolve in ether, or in mineral acids, but became soft, and lost their outlines entirely in soda; they were probably albuminous concretions. Imbedded in this material, just within the choroid and beneath one of the slight bulgings of sclerotic, was a little globular body, as large as a small shot, smooth, grey-brown, and quite free. The granular matter around it was of a dark brownish-red colour. This body consisted of a laminated cyst, containing granular pigmented masses of irregular size; it was probably a fibrinous cyst enclosing an old blood clot; no foreign body was detected. An examination of the choroid showed its epithelium to be absent in most parts, and represented in others by irregular pigmented masses, and the elastic lamina could not always be seen. The granular albuminous material of the subretinal space adhered firmly to the inner surface of the choroid. In many parts the elastic lamina was seen to give off, or pass inwards into, branching processes, having a vitreous refraction and becoming blended inwards with the granular matter. Between these highly refracting stems and branches were enclosed spherical spaces, filled with material of a different refracting power, and quite structureless, probably incipient colloid bodies. The chorio-capillaris seemed normal. The deep layer of the choroid was, however, much altered. Its stroma was infiltrated, and opened up, in some parts very widely, by finely granular albuminous effusion, and there was an abundant production of large oval inflammatory corpuscles in close connection with the stellate pigment cells,

and also around the congested blood-vessels. These cells had very much the same refraction as cartilage cells. The ciliary processes were atrophied, and a considerable distance from the margin of the lens, their hinder surface being covered by a layer of toughish white material, and their folds quite lost. Occupying the region of the ciliary muscle, as far forward as the ligament: irid: pectinatum, was a layer, $\frac{1}{16}$ inch thick, of the same finely granular albuminous material as that in the anterior chamber, containing, however, some of the stellate pigment cells of the part, and large nucleated oval corpuscles. The suspensory ligament of the lens was similarly infiltrated, and enormously swollen by albuminous fluid and inflammatory corpuscles of smaller size than those in the ciliary region.

Eyes Lost after Small-pox and Fever.

15. *Staphyloma of Cornea, with thickening of Staphylomatous tissue (? after perforating ulcer); following Small-pox.*

The eye of one of Mr. Bowman's patients; it was lost after small-pox. The cornea was staphylomatous, showed a large central opacity. On opening the eye, the cornea was found much thickened at its central part, where also the staphylomatous bulging was most marked. The iris was thinned, and in contact with the cornea; there was no well-defined pupil. The other structures appeared (to the naked eye) normal.

16. *Post-variolous perforating Ulcer of lower part of Cornea—Subsequent blow on Eye—Suppuration of Vitreous.*

Henry Whellams, æt. 4 years; under the care of Mr. Streatfeild. He had had small-pox four months before excision; his right eye became inflamed immediately after the small-pox, according to the statement of his friends. He attended as an out-patient for five weeks, the eye remaining quiet, when one week before excision he fell on his face, and in all probability struck his eye, for it rapidly became very painful and much congested. At the date of operation, the conjunctiva was much congested; the upper half of the cornea was clear, but the lower part was converted into a large and prominent opaque staphyloma. It was opened a fortnight later by a horizontal antero-posterior

section. The staphylomatous part of the cornea was thickened; the iris was in contact with it, and the transparent lens pushed forward. The vitreous was in a state of recent suppuration. The retina was *in situ* everywhere, but was in parts of a patchy yellow colour. Near to the disc, and in one or two other parts, the retina adhered to the suppurating hyaloid, and the two together formed a swollen yellow membrane, between which and the choroidal epithelium, there was a layer of pus. The choroid appeared, to the naked eye, to be healthy.

17. *Staphyloma of the Cornea (after perforation?), following "Fever."*

An eye removed by Mr. Streatfeild, and showing a staphylomatous condition of cornea with the iris spread out on its posterior surface. The other structures looked (to the naked eye) normal. It was said to have been lost after "fever," five months before excision.

Eyes lost by Ulceration and Sloughing of Cornea.

18. *Perforation of Cornea by "Ulcus Corneæ Serpens"—Iris and Lens pushed forwards—Choroid stretched—Subretinal albuminous effusion.*

A middle aged man, Mr. Hutchinson's patient, attending for "ulcus corneæ serpens." He attended for more than four months, refusing iridectomy in the first instance, and when the eye was lost, declining excision also for several weeks. At the date of excision, on May 11, 1871, the lost eye was congested and painful. The cornea seemed to have given way in two or three places, the perforations having closed again. The cornea was opaque and irregularly staphylomatous.

The globe was divided antero-posteriorly three weeks afterwards. The iris was thinned, and, as Mr. Hulke aptly terms this condition, "frayed out" on the posterior surface of the cornea. The lens was pushed forwards. The choroid at its passage into the ciliary processes was diffusely thinned, and in addition, presented numerous patches of abrupt absence of pigment, through which the sclerotic could be seen; these formed a complete narrow zone. In shape these patches were semicircular or crescentic, and in all cases the concavity of the curve looked forwards. They

were probably the result of stretching. Between the choroid and the retina, there were very numerous dots and small patches of opaque whitish yellow flocculent material, which at the ora serrata formed an almost continuous zone; it was composed of fine granular matter and oil globules, with some rather doubtful small inflammation cells. The retina appeared normal to the naked eye.

19. *Recent Suppuration in a lost Eye—Eye lost many years—Old detachment of Retina with inflammatory thickening in Ciliary region and Hyaloid Fossa, probably after perforation of Cornea—Recent ulceration of Cornea, and suppuration in subretinal space.*

Geo. A. C., æt. 22, under the care of Mr. Critchett. The eye had long been lost, and lately had become painful. After excision T—. On the cornea was a large ulcer occupying $\frac{1}{3}$ of its area. The iris was in contact with the cornea, and drawn towards the ulcer, but there was no perforation. Probably the cornea had formerly been perforated, and had ulcerated again lately. The eye was of good size and shape. Hardened in spirit, and divided in the antero-posterior direction, through the optic nerve. Iris thinned out and in contact with cornea. Lens nearly spherical, small, and pushed forwards. Ciliary processes thinned. There was much tough white tissue of old date in and about the suspensory ligament, and in the position of the ciliary muscle. The retina was detached, except at the optic disc, and could barely be recognised as a toughish membranous substance prolonged from the disc towards the middle of the eyeball. The large subretinal space, and small remains of vitreous quite full of recent yellow pus, the corpuscles of which had not undergone any degeneration. The choroid was in many parts devoid of pigment, but I could not be sure that this was not due to carelessness in roughly removing the pus, which adhered to the inner surface of the choroid in many parts.

Eyes Lost by Purulent Ophthalmia in Infancy.

*20. *Left Eye* T +—*Unusual Pigmentation of Retina secondary to Choroiditis—Optic disc cupped—Choroidal disease at yellow spot, &c.—Stretching of Anterior part of Choroid, following perforation of Cornea.*

Harriet Garling, æt. 31, under Mr. Streatfeild's care. She

lost both eyes from purulent ophthalmia in infancy; the right was painless and shrunk. The left eye had recently become inflamed and painful. Before excision it was noted that the cornea was slightly staphylomatous, and universally opaque with denser white dots; there was recent ulceration at the centre, and the cornea was vascular. T + 1. The eye was put into glycerine and water for a few days, and then divided into an anterior and posterior half.

The choroid and retina were not displaced. There was no lens. The iris was in contact with the cornea, and irregularly thinned. The choroid showed extensive atrophic changes affecting both its epithelium and stroma. The epithelium was everywhere irregular, and in some parts quite absent. Surrounding the disc was an irregular ring of completely atrophied choroid, joined at one part to another large patch of the same kind; over this area the sclerotic showed through the choroid. The epithelial pigment was here collected near one side of the patch into irregular islands made up of round black and brownish black dots separate or aggregated into large masses; a narrow imperfect ring of the same pigment was situated at the rim of the optic disc. Another patch as large as the disc, and of the same kind as the one already described, occupied the region of the yellow spot, but the pigment masses here occupied the centre of the patch. The ciliary processes at their commencement were detached from the anterior margin of the choroid over nearly half the circumference of the globe. This detachment had the appearance of a rent, being quite narrow at each end, and about $\frac{1}{12}$ inch wide at its middle; it was probably due to stretching of the iris and ciliary processes after perforation of the cornea. The optic nerve was wasted. The optic disc was rather deeply but not quite uniformly cupped up to its margin. The retina was very curiously pigmented in the equatorial region. The peculiarity consisted in the presence of elongated patches of pigment from $\frac{1}{4}$ to $\frac{1}{2}$ inch in length, and from $\frac{1}{12}$ to about $\frac{1}{8}$ inch in width, tapering at each end, and arranged with their greatest length in the antero-posterior direction; two of them began at about $\frac{1}{8}$ inch from the disc, the rest at greater distances; one or two came forward as far as the ora serrata. There were seven or eight of these pigmented tracts. When magnified about 30 diameters they were seen to consist of irregular networks of stellate and branched lines, composed of masses of coal-black pig-

ment. In general arrangement these networks resembled that of the retinal capillaries, and some of them were prolonged for some distance in almost straight directions, as if following the course of vessels. In some parts these lines and the meshes of the network were made up more or less clearly of a double row of pigment spots highly suggestive of arrangement around or along vessels. At the cut edges of the retina, and less satisfactorily in thin sections, examined under high powers, the pigment masses could be seen to occupy the inner part of the retina. When the retina was stripped from the choroid it was noticed that the epithelial lining of the latter membrane was absent from the parts covered by the pigmented retina. Some vertical sections of the retina were made after the eye had been for about a fortnight in glycerine and water, and without hardening. No stratification could be made out except a trace of the nerve fibre layer and hyaloid covering it, giving an ill-defined longitudinal fibrous appearance. The rest of the retina was quite granular. It was not possible to make out anything very certain as to the relation of the pigment to the retinal layers, but most of the masses seemed nearer the inner surface. There were, besides the larger dots and patches, very numerous minute granules of dark brown pigment pretty evenly distributed through the retina.

Glaucomatous Eyes.

21. *Glaucoma (Acute) with Secondary Cataract—Iritis occluding the Pupil—Peripheral Choroiditis—Great Enlargement of part of Posterior Chamber, forming a Circumscribed Staphyloma of Sclerotic in Ciliary Region; diffuse thinning of Sclerotic—Albuminous alteration of Aqueous and Vitreous—Subsequent Glaucoma of other Eye.*

Esther R., 52, under Mr. Bowman's care. The notes of condition before excision kindly supplied by Mr. Rogers. Had seen "rainbows" before right for years. Acute glaucoma two years before excision, followed by several other attacks, and ending in total blindness a year before. The left eye had suffered in much the same way, but more recently, and was not so much damaged. Before excision, right eye, T + 1; shallow anterior chamber; secondary cataract; large, semi-transparent

staphyloma in ciliary region above, as if sclerotic were ruptured. Other eye, T + 2, and the other signs of advanced glaucoma.

After excision, a staphyloma, of about the size and shape of a small haricot bean, was found in front of and between the internal and superior recti ; it just involved the corneal edge. The whole of the neighbouring sclerotic was slightly staphylomatous. The pupil was rather dilated and triangular, with the apex pointing downwards and inwards; its margins seemed adherent to the lens capsule. Hardened in chromic acid and divided nearly vertically in the antero-posterior direction.

Anterior chamber shallow and occupied by highly albuminous (coagulated) fluid, containing no inflammatory growths. Pupil closed by a thin membrane, which adhered to the lens capsule. Lens in its normal position, semi-opaque in its centre, and of dark, somewhat horn-like colour. The ciliary processes were short, somewhat shrunk, and $\frac{1}{12}$ inch distant from the lens. Suspensory ligament of lens elongated. Optic disc deeply cupped. Retina *in situ* everywhere. Vitreous shrunk to $\frac{1}{3}$ its normal bulk, and drawn forwards to the hyaloid fossa and ciliary region. Posterior $\frac{2}{3}$ of the vitreous chamber, filled by albuminous fluid. The choroid was diseased in its equatorial part, where there were a number of atrophic patches, some with, others without pigment accumulations at their margins. The sclerotic showed nothing abnormal except the staphyloma in the upper ciliary region. It was there abruptly bulged outwards, and considerably thinned; numerous blood-vessels ramified in the staphylomatous part. The inner surface of the staphyloma was lined by a thin layer of the uveal tract, with sparsely scattered pigment cells. Its cavity contained fluid, which was not coagulated by the chromic acid. The anterior and lower margin of the staphyloma just involved the edge of the cornea, which was there thickened and split into an inner and outer lamina by the cavity of the staphyloma. The thin pigmented lining of the staphyloma was continuous with the posterior surface of the iris, and from this layer imperfect septa projected a short distance into the staphylomatous cavity. The ciliary processes were not at all involved in the bulging, their outer surfaces being, as it were, dissected from the sclerotic and forming part of the posterior wall of the staphyloma, this boundary being completed by the suspensory ligament of the lens. It has been before mentioned

that the pupil was occluded, and in this way communication cut off between the anterior and posterior chambers. It thus appears that the staphyloma in this case was caused by an immense dilatation of a limited part of the posterior chamber, and that it did not communicate with either the vitreous or anterior chambers. It was therefore, in all probability, secondary to the occlusion of the pupil, and may be compared to those much commoner cases in which, when the pupil is closed, the iris is bulged forwards into cyst-like protuberances by accumulation of fluid behind it; the chief difference being that in the latter cases the eye does not become larger, whereas in the specimen here described the contents of the globe were increased by the volume of the staphyloma.

We have still to seek a cause for the yielding of the sclerotic in preference to the iris. Bearing in mind the vascularity of the staphylomatous part, the equatorial choroiditis, and the altered condition of the vitreous, we may infer, with great probability, that a local inflammatory process, attended by softening, was set up in the sclerotic after the occlusion of the pupil, and that the sclerotic thus became the least resisting of the boundaries of the posterior chamber.

†22. *Acute Glaucoma 3 Years before Excision—Symmetrical Equatorial Staphyloma—Detachment of Retina—Atrophy of Choroidal Stroma with Colloid Disease of Elastic Lamina—Lens Opaque.*

Mr. ——, æt. 55, a patient of Mr. Critchett's had an attack of acute glaucoma in one eye 2 or 3 years before excision; sight was lost in a few days. Lately the eye had become painful. When Mr. Critchett saw him the eye was quite blind, the pupil large, and the lens opaque. The peculiarity of the case consisted in the existence of a considerable staphyloma of the sclerotic on each side of the globe behind the internal and external recti muscles. The coats of the eye were here so thin that they burst when the eye was put into glycerine and water. It was afterwards hardened in chromic acid, and an antero-posterior horizontal section made through the staphylomata.

The anterior chamber was very shallow, and contained coagulated (albuminous) fluid. Lens opaque at its centre. The retina

was detached in umbrella form as far forwards as the staphylomata at the equator, where it remained adherent. In the subretinal space, which was not very large, there was a great deal of granular and coagulated material containing pigmented masses and many oil globules. The retina was much degenerated, and its normal structure not distinguishable. The optic disc was moderately cupped. The vitreous still occupied a considerable space; it was coagulated, opaque, and although quite soft it had a very distinctly fibrous arrangement, tearing and splitting easily in the antero-posterior direction only. It was composed of large fibrinous looking bands and cords, with numerous scattered round inflammatory cells containing single nuclei, and many highly pigmented spherical granular masses. The choroid varied in different parts. Near the disc its epithelium cells remained in some parts of good shape and size, and in close apposition, while in others they were altered in form, position, and colour, and reduced to masses of irregular granules. In the staphylomatous part they were more highly pigmented, had become rounded and somewhat shrunk, while they were quite absent over large patches. The elastic lamina near the disc was normal; in the staphylomatous part numerous colloid bodies were attached to it. There was nothing obviously amiss with the chorio-capillaris at the back of the eye, but the deeper layers in the same situation were œdematous and atrophied, their structure being opened up into large circular spaces containing coagulated material and circular bodies like myeline, while the stellate pigment cells were small and seemed to have lost their processes, for they appeared as oval, or even round pigmented cells, of smaller size than the healthy cells of this part. The choroid at the bulging parts was very much thinned, and too adherent to the sclerotic; the stellate pigment was here deficient in many parts, and distributed irregularly. The sclerotic was considerably but not abruptly, thinned at the staphylomatous parts.

23. *Disseminated Choroiditis in both Eyes, with Secondary Pigmentation of Retina—Glaucoma, probably Secondary to the Choroiditis, in Right, and followed by Cataract—Double Iridectomy—Excision of Right—Illness during Lactation at time of first Failure of Sight.*

Mrs. P., æt. 47, Mr. Hutchinson's patient. *History.* 18 years

before excision of her right eye the sight of both eyes failed, so that she was "almost blind" for several weeks; she asserted that the eyes were not inflamed at the time. This was during an illness in which she lost the use of her left limbs, and had severe pain in the left forehead and left side of the body. The illness was of 3 months' duration, and occurred during lactation, but she recovered her sight perfectly in a few weeks after its failure. She took much calomel and was salivated by it. 9 years later the right eye again failed, and presently became all but blind, in which state it remained ever afterwards. She had known of the cataract for 3 years. For a year and a half the left eye had been gradually failing. In the spring of 1870 double iridectomy was done elsewhere, but she did not know why the operations were considered necessary. She had lived for many years in India, and while there she often had ague. For years she had been liable to severe frontal pain, latterly worse on the left side; quinine sometimes seemed to cure the pain. For 2 or 3 years she had been getting deaf on the left side. She had had a large family, and many of her children had died in infancy, but there was no clear history of syphilitic symptoms in the patient or her children.

Condition of Eyes on Admission. Right, Lens opaque, iridectomy has been done, can see light, no signs of iritis. Left, iridectomy has been done, no signs of iritis, opacities in vitreous. Large patches of choroidal atrophy around disc and at periphery, and in latter position star-shaped collections of pigment as in retinitis pigmentosa, but only on patches of choroidal atrophy. Disc of good colour, not waxy. Sees large letters. The right was excised several months later, being useless, and a source of mental irritation to the patient. It was hardened for 3 weeks in chromic acid, and divided into anterior and posterior halves.

The vitreous and hyaloid, rendered opaque by the solution, were removed. Iris had been removed well up to ciliary margin at the iridectomy; its pigment disturbed and atrophied. Lens much shrunk and displaced outwards. Ciliary processes atrophied. Choroid showed extensive signs of long-standing disease; its epithelium was nowhere normal, being, even in the least affected parts, irregularly disturbed and collected into minute circular dots as large as several hexagonal cells. The stroma was much atrophied; around the disc, at the yellow spot,

and in various positions nearer the equator, it showed large irregular patches of diffuse thinning with absence, more or less complete, of stellate pigment. On some of these there were many large star-shaped accumulations of coal-black pigment (altered epithelium). The earlier stages of formation of these large patches could be seen in very numerous little circular, sharply-defined patches of atrophy, with or without marginal or central pigment accumulation. Optic disc pale and deeply cupped. Retina everywhere in apposition with choroid; in its substance were a great many small round pigment dots, blackest at their centres, and composed of small granules. Many of these pigmentations of the retina were distinctly in front of the retinal vessels. The structures were not examined with high powers.

New Growths.

*24. *Glioma of the Retina sprouting into the Vitreous—Extension of the Disease into the Optic Nerve, and Transplantation on to the Choroid.*

George Croydon, æt. 3 years, living at 30, Henry Street, Deptford, came under Mr. Critchett's care early in January, 1871, with a history that "something white," which "seemed to float about," had been noticed in the pupil for about a month. The diagnosis of detachment of the lower and outer part of the retina was made. The child continued to attend, and it was found that the detachment gradually increased in size, and that it finally encroached upon the central and upper parts of the vitreous space, and could be seen as a pinkish-white mass quite easily, without the assistance of either mirror or lens. The iris was gradually pushed forwards, and at last was in contact with the cornea. The tension was latterly somewhat increased, and the pupil dilated, but there was no evidence that the eye was painful. Finally there were signs of iritis in slight irregularity of the pupil and the presence of adhesions. The presence of a new growth became certain in May, and on the 23rd of that month Mr. Critchett removed the eyeball. With reference to the child's health previous to the eye affection, there is nothing of importance to note; he had had "congestion of the brain" at the age of a year and a half, and had passed through

whooping-cough and "glass-pock." He was a healthy looking boy.

The eye was divided vertically in the antero-posterior direction. The retina retained nearly its normal curvature, but was very slightly detached from the choroid in a few places. It was almost everywhere much thickened and semi-opaque, but some parts were still transparent. Sprouting from its inner surface, and nearly filling the vitreous chamber, were numerous very soft, slightly translucent, pinkish-white growths; they were irregular in size and shape, ragged on the surface, and imperfectly isolated from one another. One, much the largest, occupied the lower and outer part of the retina, filled more than half of the vitreous space, and involved the optic disc. The remains of the vitreous space itself contained irregular, shreddy, and pulpy bits of the tumour, detached no doubt chiefly by manipulation, also numerous specks, and small masses of opaque yellowish material, of curdy and gritty consistence, and lastly bloody fluid containing abundant recent clots. The posterior surface of the lens capsule was covered with shreddy growths, most abundant at its circumference. The lens itself was transparent, and not displaced. The outer surface of the retina was smooth everywhere, except at the lowest part of the eye; here, where the new growth was thickest, the outer surface of the retina was somewhat lobulated, and over a large patch below the optic disc it was rough. The choroid of the nasal half was examined everywhere, in the temporal half only the part in the neighbourhood of the optic disc. Below the disc, and corresponding with that part of the retina which was rough on its outer surface, the choroid was covered by a thin layer of opaque, white, new growth. In the front of the eye the ciliary processes were more or less adherent to the outer surface of the much thickened retina. No thickening was observable at any part of the choroid. The iris appeared (to the naked eye) quite healthy, the gliomatous growth having passed no further forward than the suspensory ligament.

The new growth, examined while quite fresh, appeared to be entirely cellular; I could find no trace of fibrous structure. The cells were all, or almost all, round; in size they varied, the immense majority being small, while a moderate number were considerably larger, but more faint in outline. Some of these large cells showed single nuclei, but the small ones appeared

quite uniform until they had been kept a few days in dilute glycerine, when most of them showed one or more minute bright dots. I noticed a very few nucleated spindle-shaped cells, of no very constant size, and perhaps not properly parts of the new growth. The curd-like masses consisted of the elements of the tumour undergoing fatty and calcareous degeneration. The growth contained numerous loops of large capillary vessels. On examining a transverse section of the optic nerve, about a line from the eyeball small cells were found in the fibrous septa between the bundles of nerve-fibres. These cells had the same size and characters as those forming the bulk of the retinal tumours; they were frequently arranged in groups containing from four or five to more than a hundred cells, but many scattered cells were seen which could not be distinguished from those in the groups. From the abundance of the glioma cells in this part, we may probably infer that the proximal end of the divided nerve was infected to some extent at the time of the operation, and that an extension of the disease will take place more or less speedily along the nerve trunk and into the brain.

Portions of the thinnest and most healthy-looking part of the retina were hardened in chromic acid, and vertical sections examined microscopically. All the layers except the rods and cones could be made out with tolerable ease in the transparent parts of the retina, but in parts thickened and rendered opaque by abundant gliomatous degeneration, only masses of pure glioma tissue were seen. Even in those sections which showed best the normal stratification of the retina, the relative thickness of the different layers was altered. This alteration consisted in overgrowth of the granular layers, and especially of the *outer* granular layer; there was also very marked overgrowth of the connective-tissue (radiating) fibres in the outer part of the retina. It would thus seem that in its earliest stage the gliomatous degeneration affected, at least in some parts, the *outer* layers of the retina; and although I have not been able, satisfactorily, to show in microscopic sections that it subsequently penetrated the inner retinal layers, yet it is certain, from the foregoing description, that this must have occurred. Only in one part had the growth sprouted towards the choroid, and it was just at that part that a thin layer of glioma tissue was adherent to the inner

surface of the choroid. In the choroid no clusters of glioma cells could be found. Sections made where the choroid was covered by the layer of new growth showed characteristic heaps and clusters of glioma cells resting upon the inner surface, but nowhere penetrating beneath the elastic lamina. The hexagonal pigment cells in the immediate neighbourhood of the glioma clusters became irregular, and disappeared altogether on the parts occupied by the new growth, and even over a narrow belt surrounding each island of glioma. In the ciliary processes, where the pigment cells are several layers thick, no disturbance seemed to have been caused by the adhesion of the glioma cells to the inner surface of the uveal tract. No glioma clusters were seen in the outer layers of the ciliary region.

25. *Glandular Tumour of Eyelid of somewhat unusual character.*

Mr. Streatfeild removed this specimen from the left upper eyelid of a girl aged 11 years. It had attained the size of a raspberry, and the patient said that it had been growing for a year. It projected considerably from both surfaces of the lid, but was not adherent to the skin. It was not painful.

When an incision was made into the tumour from the conjunctival surface, no tarsal cartilage was recognized, and the growth was found to be solid and uniformly firm throughout; its cut surface did not bleed. It was removed together with the closely adherent conjunctiva. There was no capsule, but the deep part of the tumour (that nearest the skin) easily separated from the subjacent muscle. The section of the tumour had a yellowish colour, and a finely granular structure, which was more easily seen with the aid of a lens; the individual granulations projected slightly from the surface. Thin sections showed that it was composed of very numerous gland follicles, with considerable overgrowth of the connective-tissue elements of the gland. The follicles were in many instances branched or furnished with secondary pouches. Some of the follicles became elongated and narrowed as if about to pass into ducts.

The large size, uniform firm fleshy texture, absence of cyst-wall, and relative abundance of hypertrophied connective-tissue, are points in which this glandular tumour differed from the common tarsal cysts.

26. *Inflammatory New Growth from the Sclerotic.*

This specimen was removed by Mr. Bowman from the left eye of a woman aged 30; it was situated near the inner canthus. Before removal, it appeared as a small rounded swelling beneath the conjunctiva, and not at all adherent to this membrane. The woman had not noticed it for long, and it had given her no pain. There were no signs of inflammation about it. Mr. Bowman cut it off, together with the overlying conjunctiva on a level with the sclerotic. It was firmly adherent to and seemed indeed somewhat imbedded in the sclerotic, so that probably a part of the growth was left *in situ*. The part removed was as large as a mustard seed, firm, and of a yellowish-white colour. It consisted of fibrous tissue arranged in the form of a wide mesh-work, and everywhere infiltrated with inflammatory products of low development and undergoing degeneration. The structures alluded to were pus-like corpuscles for the most part becoming granular, large spherical granule cells, numerous free small granules, and a few spherical masses with a radiating crystalline structure. The pus-like cells were far more numerous than any of the other elements. I could not find anything like a pus-containing cavity (the fibrous network being present everywhere), so that the term abscess can scarcely be applied to the growth, although it contained cells which I could not distinguish from pus.

†27. *Tubercles of the Choroid in a case of Acute Tuberculosis.*

Geo. E. W., æt. 40, was under the care of Dr. Ramskill, in the London Hospital, suffering from acute tuberculosis. At the *post-mortem* immense numbers of miliary tubercles were found in the lungs, peritoneum, beneath the capsule of the kidneys, in the tunica vaginalis, and a few similar bodies in the pia-mater at the base of the brain. The patient had not complained of amblyopia during life, and the eyes were not examined with the ophthalmoscope. The back of the left eyeball, including more than half of the globe, was removed for examination after death. The retina was in apposition with the choroid. A number of small, whitish spots were seen beneath the retina, and they could be distinguished as semi-transparent dots through the sclerotic when the eye was held up to the light. When the retina was removed,

these dots were found to be little whitish elevations of the choroid. The choroidal epithelium seemed, to the naked eye, to be quite absent from most of them, but one or two of the smallest were still brownish on the surface. There was no pigment accumulation around their bases, the choroid appearing quite normal up to the commencement of the elevations, and there seeming to lose its epithelium rather suddenly, but not so abruptly as to leave a very sharply-defined edge. The elevations themselves were whitish and slightly translucent. There were nearly a dozen of them, and they were distributed about the back of the eye, none being present in the equatorial region. There were several spots, near the equator, of choroidal atrophy with marginal pigment accumulation, and without any elevation of surface; these were probably of old standing, and had nothing to do with the recent miliary tubercles. No microscopic examination of the tubercles was made. This specimen is preserved in the museum of the London Hospital Medical College.

*†28. *Tubercles of Choroid in a case of Acute Tuberculosis.*

The backs of the eyeballs of Thos. W., æt. 32, a patient in King's College Hospital. Presented by Mr. Francis Warner. The patient had been getting thin for 12 months, and had had a cough with expectoration, occasionally blood-streaked, 3 months. He was ill for a few weeks, and died a few days after admission into the hospital. His temperature ranged from 99·5 to 103. At the *post-mortem* abundant miliary tubercles were found in the lungs, liver, spleen, and kidneys. There were no tubercles visible to the naked eye in the pia-mater, but there was considerable opacity of the arachnoid, and an increase of subarachnoid fluid. There were ulcerations at the posterior part of the vocal cords. Several of the mesenteric glands were enlarged, and contained cheesey matter. The tubercles in the choroid in these specimens were less numerous than those in the one before described, but had precisely the same naked-eye characters. They were not examined microscopically.

Besides the specimens marked above as preserved in the Museum, the following microscopic objects have been added:—

1. Injection (transparent) of the lens capsule of a kitten, $2\frac{1}{2}$ days old.
2. The cornea of the same kitten showing the vascular loops at its margin injected.
3. The pupillary membrane of the same kitten imperfectly injected.
4. Injection (opaque and incomplete) of the chorio-capillaris of a horse (two preparations).
5. Section of optic disc and neighbouring retina from a specimen of recent acute neuritis (No. 2 in "Report").
6. Vertical section of choroid with a cluster of glioma cells growing on it. Also a piece of the infected choroid for examination of its inner surface. (From No. 24 in "Report").
7. Sections of the deposit preceding the formation of a rodent ulcer.
8. Sections of a remarkably deep glaucomatous cup.

Javal's Optometer for determining Astigmatism has been presented to the Museum by Mr. Bowman.

The Books in the subjoined List have been added to the Library during the quarter:—

Ruete. Lehrbuch der Ophthalmologie. 2 vols. 1855.

Dixon. Diseases of the Eye; a Treatise contributed to the 2nd Edition of Holmes's System of Surgery. 1870.

Galezowski. Du diagnostic des Maladies des Yeux par la Chromatoscopie Rétinienne. 1868.

Wilson. Lectures on the Theory and Practice of the Ophthalmoscope. 1868.

Helmholtz. Optique Physiologique. Traduite par E. Javal et N. Th. Klein. 1867.

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NOTE ON A NEW METHOD OF PRESERVING AND MOUNTING EYES FOR EXAMINATION BY THE NAKED EYE OR BY LOW POWERS OF THE MICROSCOPE.

By Edward Nettleship, F.R.C.S., Curator to the Hospital.

It is very desirable to be able to mount eyes and many other small specimens in some preservative material sufficiently thick to prevent the object from moving about, and which, at the same time, will neither render the specimen opaque (as spirit does), nor cause it to swell and become too transparent, as is the case when glycerine is employed alone. If the preservative does not evaporate so much the better, for then we need take no special precautions about cementing the cover-glass.

I believe that glycerine jelly will be found to fulfil all the above conditions exceedingly well in most cases. My own experience of this substance is at present very limited both as to the number of specimens mounted in it and the time which has elapsed since they were put up. I have hitherto mounted only about 20 specimens, and the oldest of them has not yet been preserved quite 3 months. The results on the whole are good but not perfect, and I shall be much obliged to others working at the same or kindred subjects who will kindly let me know of any improvements that may suggest themselves in the composition or use of the jelly.

The eye, before being mounted in jelly, must be soaked for several days in some preserving fluid, chromic acid fluid, spirit and water, or glycerine and water. In specimens which do not require to be hardened I have often used a mixture of 1 volume each of glycerine and methylated spirit with 2 volumes of water; this fluid preserves the structures without much alteration for several weeks at least; even the lens is scarcely changed by it. If the specimen has been hardened in chromic acid it is better

(after making the necessary sections) to remove the acid to a considerable extent, by placing the eye in weak solution of soda (about 1 volume of liq. sodæ, B. P. to 6 or 8 volumes of water; otherwise the chromic acid will stain the jelly of a dull-greenish colour. The soda solution also clears the retina when it has been made opaque by chromic acid, but the retina rendered transparent in this way is too soft for microscopical examination, so that any portions required for this purpose should be removed before the soda is used. The halves or parts of the eye thus hardened or preserved are then to be filled with the melted glycerine jelly, and the latter allowed to become solid. Care must be taken at this stage that the warm melted jelly quite fills all the small cavities and interstices in the eye, especially the anterior chamber, and the subretinal space in the case of a detached retina, &c.; if this precaution be not taken, and watery fluid occupy any part of these lesser cavities, the eye will afterwards become misshapen when placed in its bed of glycerine jelly. The watery fluid probably passes out into the jelly, while the latter, being solid, cannot replace the fluid, and thus the coats of the eye are pressed inwards. It is best to remove the remains of the fluid as far as possible with bits of blotting paper, before pouring in the jelly. The jelly should be poured into the small cavities through a tube with a capillary end, which can be introduced into the interstices, and into the lowest parts of the anterior chamber; in this way all watery fluid can be washed out by the warm jelly.

When the jelly filling the eye has become solid, the specimen may be permanently mounted in the glass cell by simply filling the latter with melted jelly, placing the eye in it, and putting the cover-glass in position carefully. In order to prevent leaving air bubbles between the cover and the contents of the cell, the latter must be very nearly full, and the cover be then slid into position from one side, and allowed to sink by its own weight into the enlarged mouth of the cell made to receive it. By gentle pressure any

superfluous jelly should then be squeezed out. The whole cell and cover should then at once be washed in a good stream of *cold* water, in order that the jelly which has been squeezed out may be thoroughly washed off; the whole is then to be carefully dried, and a layer of cement at once applied over the groove between the cover and the cell. Brunswick-black or Bell's cement answer very well, and probably gold size would do as well as either. If, instead of applying the cement at once, we leave the cell uncemented for several hours, until the jelly has quite set, we shall probably find that one or more bubbles of air have been sucked in by the contraction which the jelly undergoes in cooling. If the cement has been applied before the jelly cools, we shall find one or more drops of cement sucked in instead of air. The air-bubbles are not objectionable so long as the jelly remains solid, but if for any reason it ever becomes melted again, they may then float over the specimen and obscure some part of it; this will not occur with the drops of cement.

A few words on suspending the specimen. If we could quite depend upon the temperature of the jelly always remaining below melting point there would be no need in most cases to suspend the specimen, for when first placed in the cell the eye generally floats on the jelly and remains in contact with the under surface of the cover-glass in the best possible position. In a very warm room, however, the jelly sometimes becomes semi-fluid again, and the eye often sinks to the bottom of the cell when this happens; it has gradually absorbed the jelly and become of slightly greater specific gravity than it was when first mounted. For this reason I have suspended all the more recent specimens in the ordinary way by very fine threads of silk.

The jelly that I have hitherto used has been made by mixing equal volumes of pure glycerine and the palest calves-feet jelly; latterly I have added about 1 volume of creosote to each 500 volumes of the jelly, as a precaution,

and not because I had any reason to distrust the keeping qualities of that made without creosote. The calves-feet jelly was made specially for me by Messrs. Batty and Co., of Finsbury Pavement, and was of a pale-yellow colour. Made in this way the jelly costs a little less than $2\frac{1}{2}d.$ a fluid ounce, while that made by Rimmington is sold retail, at about 2*s.* for the same quantity. Rimmington's jelly is however, firmer, and sets more quickly than that which I have made, and these qualities are desirable, especially the increased firmness. I shall be much obliged to anyone who can tell me how to obtain a perfectly clear jelly which will remain solid at a somewhat higher temperature, and become firmer when cold than that made as above. If it could, in addition, be made quite colourless, it would be an advantage.

Part II.

A Periscope

OF

CONTEMPORARY OPHTHALMIC LITERATURE.

CHOROIDO-RETINITIS COMPLICATING CONVERGENT AND ALTERNATING STRABISMUS.

In the "Annales d'Oculistique," January—February, 1870, p. 84, is a note of a communication by Umé (Arch. Méd. Belges, 1870, t. xi, p. 18) on a case of choroido-retinitis complicating convergent strabismus. He calls particular attention to the causes of defect of vision, so frequently met with in the deviating eye. He says the cause ought to be made out by ophthalmoscopic examination before the operation, in order that the operator may know definitely the result likely to be attained as regards the restitution of binocular vision. He would abstain from operating, if he wished for anything but to remove the squint, in cases where affections of the fundus were visible which appeared irremediable.

THE ACTION OF ATROPINE ON INTRA-OCULAR TENSION.

In the "Annales d'Oculistique," March—April, 1870, p. 108, is a paper by Dr. Adamuk on the manner in which atropine acts in diminishing the tension of the eyeball. He considers that the intra-ocular tension is the result of the "lateral pressure" exercised (by the blood) on the (walls of the) vessels, and can, consequently, be diminished by diminution in the "lateral pressure" in the vascular system in general, or by augmentation of the "tonicity" (state of contraction) of the walls of the intra-ocular vessels. The former cannot be produced by the local application of atropine as commonly used; the latter cannot be measured exactly, and must be investigated indirectly. The means adopted by the author was to study the act of osmosis from the vessels, which he considers to be in inverse proportion to the "tonicity." After the use of atropine osmosis is diminished. If, on introducing a trocar into the anterior chamber of a non-atropised eye one obtains (for example) five

drops of aqueous in one minute, there will only escape from an atropised eye scarcely as much as three drops. Moreover any irritation of the conjunctiva, which would augment the filtration in a normal eye, no longer produces this effect in the same degree, if the eye be under the influence of atropine. He quotes an experiment (showing this).

The results of irritation of the great sympathetic show that, notwithstanding increased intra-vascular pressure, augmentation of "tonicity" (that is to say, of contraction of the vessels) is capable of producing diminution of osmosis, and it is reasonable to suppose that a similar explanation applies to the action of atropine. After section of the sympathetic, osmosis takes place twice as rapidly as normally occurs. Under the influence of atropine, the contracted vessels limit, by the condensation of their walls, the active transudation of liquids; moreover the walls exhaust a considerable part of the pressure of the blood, whence results a diminution of the extra-vascular pressure. It is in these two influences alone that one must seek for the cause of the relaxation of intra-ocular pressure which one notices during the action of atropine.

Further illustration may be obtained from the result of a rapid evacuation of the aqueous. The vessels enlarge so rapidly that extravasations are produced, unless the eye be under the influence of atropine, when no such accident occurs. This exception is explained by the augmentation in the tonicity of the walls of the vessels overcoming the pressure of the blood from within outwards. Again, if the anterior chamber be punctured, contraction of the pupil follows, depending, in great measure, on the dilatation of the vessels from diminished extra-vascular pressure. If the eye be atropised the pupil contracts but slightly, or even not at all. There is one apparent objection to the author's theory. It is well known that diminished intra-ocular tension produces increased ocular refraction, therefore, under the influence of atropine, the "far point" ought to approach nearer to the eye. This objection, however, disappears if it be allowed that when changes in the condition of osmosis from the vessels occur, that taking place in the lens is also modified. Such the author states is the case, as proved by Woinow. When osmosis from the vessels diminishes, the osmosis in the lens diminishes also, its surface becomes flatter, and the "far point" is removed from the eye.

Lastly, the fluid which transudes under the influence of atropine is less plastic than under normal conditions. This is important in cases where the lens, or the whole eyeball, has been much damaged. False membranes, or secondary cataracts, are less likely to form. Atropine ought to be used whenever either the anterior or posterior chamber has been opened. Analagous experiments have been made with Calabar bean, but in its pre-

sent form of application it excites so much irritation that the results cannot be depended upon.

The author gives the maximum diminution of intra-ocular tension, under the influence of atropine, which he has observed, as equivalent to six millimètres of mercury. To show the effect of atropine in preventing increase of tension, he stimulates the conjunctiva of a cat with liquid ammonia The eye then shows (with the manometer) a tension of 33 mm. of mercury, having previously had a tension of 23 mm. He now instils atropine, and afterwards irritates the conjunctiva, the tension then only rises to 28 mm.

DEMONSTRATING OPHTHALMOSCOPE.

In the " Annales d'Oculistique," Mai–Juin, 1870, is a note of a demonstrating ophthalmoscope, invented by MM. Wecker and G. Roger (from the Bull. de l'Acad. des Sciences). The authors have tried to solve the problem of allowing two persons to see, at the same time, a sufficiently illuminated and well defined image. They make use of the total reflection obtained from the hypothenuse (surface opposite the right angle) of a rectangular prism, interposed in the course of the luminous rays. In the direct method of examination the inconveniences attendant on the use of a prism (decomposition of the light and deviation of the rays) are obviated by placing a second prism at the back of the first so as to form a parallelopiped. This juxtaposition of the prisms produces the same result as a thick plate of glass placed in the course of the light. As the system (of prisms) has no other influence on the direction of the rays of light than that of causing a slight lateral deviation, the lens ordinarily used can be added to it so as to make one apparatus.

The prismatic object glass, therefore, is composed of a plano-convex lens (which can be changed at pleasure) and of two rectangular prisms, whose hypothenuses are placed in juxtaposition back to back. The material employed was crown glass, and the angles of the prisms were of 42 and 48 degrees.

This instrument can be used in three different ways: (1) One observer illuminates the fundus in the ordinary manner by sending the light from the mirror through the object glass. He looks through the hole in his mirror. A second observer, placed at the side, looks on the surface of the hypothenuse of the prisms. (2) The first observer places himself at the side and uses his mirror so as to throw the light on the hypothenuses of the prisms, he thus illuminates the fundus, and views it through the hole in the mirror. The second observer places himself face to face with the patient and looks through the objective. (3) Both observers illuminate the fundus, each being furnished with a mirror, realising thus, simultaneously, the first two procedures. They

look through the holes in the mirrors, and have the benefit of a double illumination. The employment of the instrument is not limited to the exploration of the fundus of the eye, but may be used in conjunction with other apparatus for the examination of the various cavities of the body.

NEW OPHTHALMOSCOPE—M. JAVAL.

M. Gavarret gives a description of the instrument (Gaz. Hebd. 1870, p. 278, No. 18) constructed by Nachet (Jun.). from the directions of M. Javal. The three plates of glass, in the instrument of Helmholtz, are replaced by a single plate, on the surface of which is laid a thin layer of platina, so as to augment the reflecting power, and a (Galilean) combination of lenses (in a small compass) obviates the necessity of interposing various lenses before the patient's eye as in the old instrument. An extremely simple mechanism allows of instantaneous focussing which can afterwards be made as exact as can be desired. This ophthalmoscope also serves as an optometer, and that in two ways; either by allowing the patient examined to focus, or this may be done by the observer; a fact of great importance in certain cases of simulated myopia, for instance, also in veterinary medicine, for the instrument determines the glasses necessary for a horse as well as for the most intelligent man. By the substitution of cylindrical glasses for spherical ones, the instrument determines the amount of astigmatism present, with surprising rapidity. Lastly, this transparent mirror, coated with platinum, has furnished M. Javal with the means of showing the fundus of the eye, of a patient, to two persons simultaneously. The instrument, adds M. Gavarret, is doubtless susceptible of much improvement in various details, but it already answers well, and allows of the examination of the fundus under a higher magnifying power than has hitherto been possible ("Annales d'Oculistique," Mai–Juin, 1870, p. 287).

GLIOMA OF THE RETINA.

Iwanoff (de Kien), in the Journ. de l'Anat. et Physiol. 1870, No. 3, p. 225, remarks on a case, cited by Hirchberg, in which the first evidences of glioma had their origin in the inner granular layer of the retina, and development had taken place outwards towards the choroid, whilst the innermost layers of the retina remained almost wholly unaffected. Though he would not deny the fact, he would certainly not hazard the tempting conclusion that glioma can only increase towards the exterior. He believes, on the contrary, that there is a form of the disease which, developing at the expense of the innermost

layers of the retina, projects towards the vitreous (" Annales d'Oculistique," Mai—Juin, 1870, p. 288).

CATARRH OF THE LACRYMAL SAC; ECTROPION AND LOSS OE EYELASHES. STILLING'S OPERATION. CURE.

Dr. Terson, of Toulouse, has communicated to Dr. Warlomont the account of a case in which he had successfully performed Stilling's operation. The patient had suffered from disease of the sac for 13 years with ectropion and loss of eyelashes from both eyelids. After the operation, and without any other remedies being used, the ectropion disappeared and the eyelashes grew again. At the end of eight months there only remained a slight overflow of tears, due to obliteration of the lower canaliculus, of old standing.—" Annales d'Oculistique," January—February, 1870, p. 85.

ADVISABILITY OF OPERATING IN CASES OF CANCER OF THE RETINA.

Fano (" Union Medicale," January 15, 1870, p. 70) thinks that extirpation of the eyeball is the rational treatment in the early stage. To abandon the patient to the natural course of the disease is to devote him to certain death. The cases of return after extirpation are not so frequent as generally stated, and those who have experienced a rapid return of the disease have perhaps operated at a stage when, the optic nerve being already invaded by the disease, it was difficult to remove all the affected parts. Dr. Warlomont remarks that he entirely coincides with this view. In cases of recurrence where this might have been prognosticated from the family history, the operation has at least had the effect of sparing the patient the violent agony to which he is exposed the moment the eyeball becomes increased in tension, a consequence which must follow, and which terminates in the giving way of the sclerotic, when this yields to the increasing development of the tumour. Moreover, were there only one case of success met with, here and there, one would be still authorised in seeking for it at the price of many reverses. Our author has done us the service of publishing two cases attended with successful results, calculated to encourage us.—" Annales d'Oculistique," January—February, 1870, p. 84.

LODGMENT OF A FOREIGN BODY WITHIN THE EYE FOR 43 YEARS.

Terson (" Revue Medicale," de Toulouse, January, 1870, p. 12) records a case in which a fragment of iron, of the size of half a grain of wheat, had been encysted by the side of a displaced lens for the extraordinary period of nearly 43 years, which had inter-

vened between the time of the accident and that at which an operation was rendered necessary.—"Annales d'Oculistique," January—February, 1870, p. 85.

PALPEBRAL GRANULATIONS.

Dr. Hairion writes on this subject ("Annales d'Oculistique," January—February, 1870, pp. 5—39). After showing how diverse are the opinions held on the matter by authorities generally, the author passes to discuss the question of the prevalence of granular ophthalmia in the armies of European nations and among the civil population, deducing some interesting statistics, and then treats of the anatomy of the conjunctiva. He specifies three kinds of glands. 1. The conglomerate (Krause) are situated in the mucous tissue on a level with the attached border of the eyelid and at the outer half only; there are from 12—18 in the upper cul de sac and from 2—6 in the inferior; they appear to be derived only from the lacrymal gland, and secrete tears; they are visible to the naked eye on prepared pieces of eyelid.* 2. The lymphatic or closed follicles (Krause and Henle) occupy, exclusively, the internal half of the cul de sac; they are small cavities, surrounded by fibres of connective-tissue and crossed by trabeculæ, which support the capillary blood-vessels; between these trabeculæ are spaces containing the elements of lymph. These follicles closely resemble the intestinal glands. Van Kempen states that they are frequently absent in man but constant in some other animals. 3. The muciporous crypts (Manz) are situated around the cornea; they are oval or roundish follicles, provided with an opening having an oval thickened margin; they are enveloped by connective-tissue fibres, and contain cells and fine granules. Stress is laid on the situation of the glands as showing that the granulations cannot be affections of these. Granulations are divided into the papillary and the vesicular. The author enters at length into the consideration of these. We give a table he has drawn up contrasting the two.

Papillary Granulations.	*Vesicular Granulations.*
1. Papillæ engorged, or hypertrophied by inflammation; an engorgement, a simple hypertrophy or hyperplasm.	1. Formed by the production of small sacs containing plastic matter, and simple, rounded globules; a neoplasm.

* After maceration in a strong solution of tartaric acid for twenty-four hours the conjunctiva becomes transparent and the glands are seen as opaque, white granules.

Papillary Granulations.	*Vesicular Granulations.*
2. They are situated on the tarsal part of the palpebral conjunctiva, beyond which they rarely pass.	2. They are situated on the surface and in the thickness of the stroma of the palpebral conjunctiva; three times out of four almost one finds them on the ocular conjunctiva at the same time, and sometimes in the tissue of the cornea proper.
3. Sometimes they are seen in the form of small, mamillated, uniform eminences, of a pale red colour, isolated from one another, and with some resemblance to shagreen, sometimes as small masses of a bright red colour, fungoid and fleshy, separated, from one another by deep fissures, and presenting sufficiently well the appearance of the fleshy granulations of suppurating surfaces.	3. They are characterised at first by small, crystalline, pearly prominences, having the appearance of small, transparent, hyaline vesicles.
4. The mucous membrane is red, inflamed, thickened, as from hypertrophy, and there is a muco-purulent discharge, heat, photophobia, and lacrymation.	4. The conjunctiva, at first, preserves its physiological characters; there is neither redness, nor heat, nor epiphora, nor any defect of sight.
5. When the papillary granulations are complicated with affection of the cornea, it is in the form of ulceration and softening.	5. If vesicular granulations attack the cornea, trachomatous pannus is developed.
6. In the papillary hypertrophy, the eyelids are thickened, and appear enlarged; hence drooping of the upper eyelid ensues, and eversion of the lower one.	6. In the last stage, the granulo-vesicular affection induces atrophy of the conjunctiva, deformity of the tarsal cartilage, and inversion of the eyelids.
7. Always the result of inflammatory mischief. The papillary granulations are not capable of direct transmission, but the ophthalmia from which they result, when it is accompanied by a purulent secretion, can propagate itself by direct contagion.	7. Vesicular granulations are transmitted by miasmatic agencies, without the conjunctiva being apparently the seat of any morbid secretion.

He gives the following contrast between ordinary catarrhal ophthalmia and the army, or Egyptian ophthalmia:—

Catarrhal Ophthalmia.	*Military Ophthalmia.*
1. It is brought about by causes purely accidental; such as irritation of foreign bodies, fatigue, privations, &c., or sporadic or endemic catarrhal influences.	1. There is only one recognisable cause; a contagious and specific principle.
2. It may spread epidemically.	2. It never spreads epidemically; its character is endemic.

Catarrhal Ophthalmia.	*Military Ophthalmia.*
3. It is propagated by direct contagion only; that is to say, by the transport of the products of secretion from the conjunctiva of an affected person to a healthy conjunctiva.	3. The principal, if not the only, mode of contagion is miasmatic.
4. It is characterised by acute inflammation of the oculo-palpebral conjunctiva, accompanied by lacrymation, smarting, photophobia, &c.	4. Its characteristic is the development, in the stroma of the conjunctiva, of vesicular (neoplastic) granulations, wholly distinctive, not accompanied by any subjective symptom, as they develope unknown to the patient, who is unaware of his condition.
5. If granulations form, they are limited to the tarsal part of the palpebral conjunctiva, and are consecutive to the inflammation.	5. The granulations commence in the retro-tarsal fold of the conjunctiva, and spread to the oculo-palpebral portion, and to the cornea. They precede the inflammation of the conjunctiva, and result from a mild and insidious irritation.
6. It is essentially acute and rarely becomes chronic.	6. It is essentially chronic; it only accidentally becomes acute.
7. It is more common in winter and spring.	7. Its intensity is diminished in winter, but returns with increased severity in the heat of summer.
8. It yields readily to appropriate treatment.	8. It is very obstinate, not yielding to the usual treatment for ophthalmia, requiring the use of particular remedies, and showing very great intractability.
9. Once cured, there is no tendency to a return without a renewal of the exciting cause.	9. There is a remarkable tendency to return, even after a long interval, without the intervention even of the exciting cause among individuals who have once suffered.
10. It runs a regular course, ordinarily a rapid one.	10. Its course is irregular, of long duration, and with periods of greatly increased severity.
11. It does not leave any alteration in the conjunctiva.	11. It leaves nearly always profound and indelible traces in the conjunctiva.

ANÆSTHESIA OF THE RETINA.

Dr. A. Sichel, junr., writes on this subject in the "Annales d'Oculistique," Mai et Juin, 1870. He understands by this term a failure of the power of transmitting sensations to the brain, with a want of susceptibility of the retina itself. The retina perceives the impression, but the patient remains unconscious of it. The attack generally comes on suddenly, follows some severe moral impression, and occurs in those who have a sensitive nervous organisation. Some few days generally elapse after a fright or loss of consciousness before the failure of sight ensues. There are no objective symptoms of the affection; the ophthalmoscope reveals no changes; a sensation of light is produced by pressure on the eyeball in any position, and the pupils are normal. The field of vision alone furnishes us with valuable information; generally there is either concentric limitation or scotomas or manifold variations. The patient may complain of any degree of loss of sight from simple amblyopia to complete amaurosis. Often the acuity of vision is only reduced to one-half or one-third of the normal standard. It is not diminished by artificial light, but is often increased by the employment of coloured glasses. Various "hysterical" symptoms are often present. The duration is uncertain and the severity of the malady is subject to variations at different times, but its course is usually benign and ends in all cases in a cure. The treatment should be of a general character. Two cases are narrated, the first is given in great detail, and was that of a man 28 years of age, whose history extended over a period of 12 years. At the commencement he was seized with loss of sight of the right eye, which came on in the course of a few days and lasted about a year. Four years later a similar attack occurred. He consulted M. Sichel, the elder, who ordered tonic remedies. The patient recovered at the end of about eight months. Seventeen days before he finally came under care the patient had been seized with a sunstroke while forming one of a picnic party. The next day he suffered from loss of consciousness for two hours, accompanied by vomiting and purging. Five days later he was seized with intense pain in the head, immediately followed by progressive failure of sight of the right eye. At the time of examination the vision of the right eye was completely lost. The chief point of interest was the variation in the extent of the field of vision of the left eye, of which numerous charts are given. At times there was an inability to distinguish certain colours. Von Græfe, being in Paris, was consulted, and M. Sichel told him he suspected that the amaurosis was simulated. The diagnosis of retinal anæsthesia was confirmed and treatment by oxide of zinc recommended (four grains divided into 200 pills, one to be taken thrice daily, and the dose increased, by one pill

every two days, to four pills three times a day). Gradual recovery followed. The sight of the right eye returned and the field of the left became normal. M. Sichel sums up the case, and remarks that it would be difficult to find a more perfect type of hysteria, and he thinks that the diagnosis of retinal anæsthesia or of hysterial amaurosis is indisputable.

The second case was very similar to the first, but the patient was a woman aged 26. The symptoms had lasted about three weeks. She had had a similar attack at the age of eight or nine years. She had a second one at the age of 15 or 16. Various methods of treatment were tried for the relief of the attack for which she came under care, but no good result followed till the oxide of zinc was employed. She then steadily improved. At the end of three months she returned home able to resume her occupation, that of a seamstress. She was of a highly nervous temperament, and presented symptoms of an essentially hysterical character. This case was analogous to the preceding, from the fact that the defect of sight was accompanied by hysteria; that there was an entire absence of any change in the fundus oculi; that phosphenes could be produced; that the result of objective examination was negative; and that vision returned under the influence of anti-chlorotic and anti-hysterical remedies.

PRIMARY CARIES OF THE ORBIT.

In the "Annales d'Oculistique" (Juillet-Août, 1870, p. 7), is a communication from Dr. Jules Sichel, in a series of more or less detached observations, on caries of the orbit. It is said to be of two kinds: primary, arising from inflammation of the bone itself; and secondary, from the pressure of tumours on the bone, or from other indirect causes. The author lays stress on the kind of tumour which, in his opinion, attends the onset of orbital caries. This swelling has hitherto escaped detailed description by authors. It is produced by a detachment of the periosteum, which is lifted up sometimes by a fluid secreted wholly by itself, and by the subjacent inflamed bone, and sometimes (and more frequently) by the products of suppuration of the bone caries. It happens, however, occasionally, in a very early stage, that the periosteum is elevated by a simple exudation on its inner surface, it is even probable that sometimes the mere thickening of the membrane accompanying the inflammation preceding the detachment, is the earliest stage of the swelling. If a case of caries be met with before any incision has been made, or before the integuments have given way, a tumour of a peculiar kind will always be present. At any rate the author has never failed to observe it. Now and then a case may be seen when the only symptoms are a dull pain, augmented by pressure

at some part of the orbital margin, some headache and slight dizziness. The inflammation may terminate in resolution, but more frequently passes on to caries, the pain then becoming more violent, and only ceasing after a certain time. Sometimes, however, it may not be increased, but disappears completely. Sooner or later one of the eyelids, generally the upper one, swells, becomes tender, and slightly reddened at one part. There is but little tenderness to the touch, and gradually at the part of the lid affected a circumscribed tumour appears, nearly always extremely tense, hard, inelastic, and analogous to that of periostitis. There is no chemosis, excepting when the swelling has given way, so as to allow of the pus escaping between the periosteum and the soft parts within the orbit; or when the cellular tissue of the orbit and the eyeball are much involved, and when the latter is pushed forwards. After the swelling has burst or been opened, the progress is always very slow, on account of the great thickening of the periosteum.

Exfoliation of the bone and cure of the caries are not much expedited by the local remedies whose effects are so much vaunted. Light cauterisation of the bone with nitrate of silver has often given advantageous results, but the author depends on constitutional rather than on local remedies.

When sinuses have formed the disease is of course easily recognised. Not unfrequently other symptoms are present, such as strabismus, diplopia, diminished mobility of the globe, exophthalmos, or a more or less evident defect of sight.

If the tumour arrives at its maximum development (the periosteum not having given way or been incised), it becomes nearly as hard as ivory, and exceedingly painful, its surface glossy, and of a deep red or purple colour. It is generally immovable, and firmly adherent to the wall of the orbit; exceptionally it appears slightly movable at its summit. In one instance only a very small tumour, elongated, as if pedunculated, was also movable at its base. Generally no fluctuation can be detected till a late stage, and the tumour has attained the size of a large walnut.

The author has more frequently met with the disease at the upper part than in the floor of the orbit. Even after the swelling has been incised, pus is liable to gravitate and collect anew deeper in the orbit, and may show itself, either behind the upper or lower eyelid. The difficulty of keeping the abscess cavities empty has given rise to various plans of compression, and M. Riberi invented an instrument for this purpose, but no very satifactory results have been obtained from any of the plans.

In the following number (pp. 93—131) the treatment of primary caries is discussed and illustrated by cases. The author then passes on to consider secondary caries and its treatment, and caries in the neighbourhood of the lachrymal organs. The paper is not adapted for reproduction here.

MEANS OF PROVING AMBLYOPIA, OR AMAUROSIS OF ONE EYE ONLY.

In the "Annales d'Oculistique" (Juillet–Août, 1870), is a note of a communication by Cuignet (Rec. de Mém. de. Méd. Chir. et Pharm. Milit. 1870, Avril, p. 320), on the means of establishing a diagnosis of monocular amblyopia or amaurosis. The author cites three. The first depends on the existence of the "blind spot." This can only be seen when one eye is shut. The test is obvious. The second consists in passing a lighted candle before the eyes from right to left (or *vice versâ*) in a darkened room. If the right eye, for example, be blind, the light, carried from right to left on a level with the eyes, can only be perceived when it has passed the bridge of the nose and affects the left eye. The third, on which the author places most dependance, and which is really of great simplicity, depends on the fact noticed by M. Javal, that when an elongated object (a pencil, for instance) is interposed between the eyes and a page of printed or written characters, this interposed object does not conceal any part of the page if the patient have binocular vision. If, on the contrary, he only sees with one eye, some of the characters are absolutely hid, just as if the pencil were actually applied to the eye. This means of proving defect is of the simplest kind, and yet the shrewdest are caught by it. Dr. Warlomont adds a yet more simple expedient, which requires no apparatus whatever, and which in a medico-legal investigation was perfectly satisfactory. If, whilst looking at an object with both eyes, a finger is placed on one of them (and thus its optic axis is displaced), the object will appear double. The eye which one has not touched continues to see the object in its real position, the other sees it below or above, to the right or to the left, according to the direction of the pressure. Show to the patient under observation two dots marked on paper, after having thus displaced the axis of one eye. If he declares that he sees four dots, it is manifest that he sees with both eyes. It is ridiculously simple.

CYST OF ONE OF THE EXCRETORY DUCTS OF THE LACHRYMAL GLAND.

M. Dubrueil relates the following case ("Gaz. des Hôp.," 1870, No. 92, p. 365). Eliza R., a domestic servant, æt. 35, applied on May 11th at the Beaujon Hospital, on account of a swelling at the upper and outer part of one eye. On examination, a nearly spherical tumour was found above the outer canthus, of the size of a large hazel nut, situated between the eyeball and the eyelid, covered by the conjunctiva, slightly reddened in its lower half, which projected underneath the free border of the upper eyelid when this was raised. When the eyelids were closed it was concealed under the upper one, which stood out in

manifest relief. This tumour had developed without apparent cause some twelve months previously. It was fluctuating, transparent, indolent, and, according to the patient's statement, it enlarged noticeably whenever she cried. The tears flowed, however, in normal quantity on the surface of the globe, the movements of which were somewhat interfered with. Vision was unaffected, the general health good, and there was little more than the deformity caused by the cyst to make the patient anxious to get rid of it.

On the 12th May, whilst the upper eyelid was raised, an incision was made with a cataract knife in the direction of the palpebral fissure, over the tumour, and quite superficially. A very thin membrane was then dissected off for some distance. It consisted of the fold of the cul de sac displaced by the tumour. Beneath, there remained a membrane still more attenuated, a pellicle, which was at last ruptured, giving exit to about a small spoonful of serous fluid, which was set apart for analysis, but was unfortunately upset. The anterior portion of the cyst was then cut away with scissors; afterwards a bandage and compress were applied. The next day there was slight swelling, on a level with the remaining portion, but this soon disappeared, and the patient rapidly became perfectly cured, the only treatment adopted being to cauterise two or three times the part of the cyst left behind.

Was this a case of cyst of the conjunctiva, rarely seen, but to which attention has been called by Sichel? or, was it really a case of cyst developed in one of the excretory ducts of the lacrymal gland? In favour of the latter view is the patient's statement that the swelling increased when she cried, and also the situation in which it was developed. The operation did not reveal anything. The examination of the fluid would have been a great help, but it was lost. A microscopic examination, in conjunction with Dr. Legros, definitely established the undoubted nature of the cyst, showing that its internal surface was lined with cylindrical epithelium, identical with that of the excretory ducts of the lacrymal gland. To sum up, the lacrymal fluid had collected in one of the excretory ducts, obliterated at its terminal or conjunctival extremity, and communicating still with the gland, as was proved by increase of size during lacrymation.—("Annales d'Oculistique," Juillet–Août, 1870, p. 75).

ASCENDING GLIOMA OF THE RETINA, FOLLOWED BY DEATH.

The following case occured under the care of Professor G. Arcoleo, of Palermo. The patient was a boy, æt. 3 years, who came under care in October, 1867. The right pupil was extremely dilated, and the eyeball was increased in size. The fundus could be seen to be occupied by a gliomatous tumour of

the retina, and had the shining reflex often noted in this class of cases (like that of a cat's eye). The presence of the tumour had been demonstrated by a practitioner five months before, the other symptoms having been noticed by the parents since the month of January. Vision had from the first been defective, and had rapidly been lost entirely. The parents refused the only available treatment, that of enucleation. Finally, however, consent was obtained; as much of the optic nerve as possible was removed. It was already affected by the disease. The examination of the eye, hardened in the usual manner, and cut transversely, revealed the following:—The crystalline was fatty and rich in crystals of cholesterine; the vitreous was nearly destroyed, only connective-tissue remaining; the choroid and iris were atrophied; the retina transformed into a considerable mass of small cells and highly refracting nuclei, arising from the inner and outer granular layers, and mixed with a limited number of connective-tissue fibres; the optic nerve was crammed with neoplastic deposits, its nerve-fibres in part destroyed, in part in course of degeneration; the sclerotic was normal, the cornea dull. Fifteen days had hardly elapsed before there was evidence of a growth about the optic foramen. This was removed and the parts freely cauterised. A slight check was followed by more rapid increase of the growth, and the cavity was soon filled anew by the morbid proliferation. The child's health rapidly failed, the glands in the groin began to enlarge, and sub-cutaneous lumps appeared in two places on the head. It was evident that, besides passing to the brain, along the optic nerve, the gliomatous growth was affecting the whole system. One remarkable circumstance consisted in the fact that the vision of the other eye, tested daily with care, remained intact till the last. The child died February 27th, one year after the onset of the disease.

Autopsy. After the scalp was removed, some fleshy tumours were seen on the epicranial aponeurosis, the most marked being situated over the superior occipital angle. These tumours corresponded to depressions, or excavations, of the inner surface of the calvaria, which at these places was much thinned, by caries and necrosis, and covered by ecchymosed and softened dura-mater. At the base of the brain, and exactly above the optic commissure, was a soft, gelatinous, reddish tumour; the structure of the left* optic nerve was disorganised from the stump to the optic tracts. The thalamus opticus, of the same side, and the third ventricle, were involved in the degenerative process. The right optic nerve had retained its normal aspect, but was slightly soft to the touch. The mass of the tumour (in the chiasma) was very soft and irregular, and did not present any trace of an external, limiting membrane. The chiasm itself was infiltrated,

* Right and left have been confused.

for two-thirds of its extent, by new growth, having the structure of a glioma properly so called, but as the disorganised left optic nerve was approached, the growth acquired the characters of a medullary glio-sarcoma, of which the cell elements, with many large nuclei, formed considerable collections. Deep incisions into the chiasma revealed the same phases of transition between a glioma and a glio-sarcoma. It was in the orbit that the greatest quantity of the glio-sarcomatous substance was collected. The same growth had invaded the sheath of the right optic nerve; the medullary substance had in great part undergone fatty degeneration.

In the continuance of visual power in the right eye in this case, the author sees fresh confirmation of the idea he expressed at the Paris Ophthalmological Congress in 1867, that there is no general or partial intermingling of the optic nerve-fibres corresponding to the chiasma, but a simple juxta-position, which does not interfere with the transmission of sensations by each eye separately.

A pathogical problem suggested by the case concerns (1) the origin of retinal glioma: (2) its conversion into a glio-sarcoma; and (3) its diffusibility. (1) The author does not admit that glioma can originate in the anterior limiting membrane. He is of opinion that the point of origin is in the granular layer, but he cannot say whether in the outer or inner one. In this case both were equally involved. (2) Virchow has foreseen the possibility of the transformation of a glioma into a mixed form, but without wishing to pronounce categorically on the point. This mode of regarding glioma receives abundant confirmation in the present case by the insensible transition along the optic nerve, and more especially in the chiasma of a glioma into a glio-sarcoma. Instead of being an exceptional occurrence, one would expect this conversion to be common on account of the special structure of the optic nerve, which predisposes to the development of a sarcomatous character. So far, however, it is only an hypothesis, which more attentive study of tumours having their seat in the nerve can alone establish or destroy. (3) Besides the present case observed by the author, there have been others noted, more especially one by M. Knapp (of Heidelberg), which do not permit of any doubt being felt as to the diffusibility of glioma. There only remains to be ascertained whether we must believe, with Virchow, that there are two kinds, a benign and a malignant or infecting glioma. If this were the case, there ought to be well-marked distinctions between them; really, all gliomata can be reduced to one and the same type. There are three modes by which a glioma may be diffused; directly, to contiguous, homologous structures (or rarely to those of a different nature); indirectly, by the formation of secondary neoplastic centres in the neighbourhood of the first; and by metastasis, the

development of secondary or tertiary tumours in the lymphatic glands, lungs, liver, or kidneys.

In its physiological aspect, the case gives rise to the question whether alterations in the texture of the optic nerve are compatible with the persistence of the visual function. The child, not long before death, could see a small pin held in the author's fingers, and took it in its own; could see his parents, &c., and yet changes were found in the optic nerve. The author considers that the medullary substance is destined for the nutrition of the nerve-fibres; that it is an unimportant element, and is interposed for their isolation and mutual independence in the exercise of their functions, and to preserve their individual integrity. Valentin and other observers have shown that the medullary substance may have undergone serious alterations, or may be quite destroyed, and yet impressions may be conveyed to the brain so long as the continuity of the nerve-fibres remains intact. So that in the case of this boy, the changes met with in the medullary substance did not signify, so long as the retina could receive, and the nerve fibres convey, impressions. ("Annales D'Oculistique," Juillet-Aout, 1870, p. 77).

EPITHELIAL TUMOUR OF THE EYEBALL.

("Ann. d'Oculistique," September–October, 1870, p. 132) Dr. Lebrun communicates the following case. We have abridged the account. The patient was a man aged 63, a weaver, who presented himself at the Ophthalmic Institute of Brabant on account of a tumour which had existed some nine or ten months. The first symptoms were slight irritation and redness in the corner of the right eye. At the end of seven or eight weeks, a small tumour was noticed towards the outer angle quite outside the cornea. The growth had steadily increased in size till it had acquired that of half a hazel-nut, forming a square, whose side equalled four and a half lines. It invaded the upper and outer two-fifths of the cornea, and encroached on the sclerotic still more; it had a fleshy appearance due to a rich vascularity from enlargement of the ciliary veins, which were well-marked and tortuous in the neighbourhood; it seemed to be made up of three lobes, of which the two smaller ones, of the size of lentils, covered the cornea, and the third, flatter, but larger than the other two combined, was lost under the vascular and thickened conjunctiva in the outer angle. The upper corneal lobe, as well as the upper border of the sclerotic lobe were highly pigmented, giving to these portions a very deep colour. This same tint was also noticed at two or three spots in the ciliary region of the outer half of the sclerotic. The pigmentation had even invaded slightly the upper part of the cornea apart from the tumour, but without producing any noticeable elevation. The iris preserved its

normal colour, position, and mobility. The only affection of the sight was a slight diminution of the field at the outer side, where the tumour encroached on it slightly. The cornea remaining perfectly transparent even up to the very border of the tumour, led to the supposition that the epithelial layer alone was, or had originally been affected. The patient was a robust countryman. He had had no pain in the eye, there was no enlargement of glands, nor any history of cancer in his family. The rapid progress and infiltrating character of the growth left no room for hesitation as to the propriety of entire removal, and even of the eyeball, if necessary. The patient consented, and fortunately it was found that the growth could everywhere be dissected off. The greatest care was exercised to remove all the pigmented parts, both conjunctival and corneal. Finally, the additional precaution was taken, by M. Warlomont, of cauterising the surface with nitrate of silver. Microscopic examination showed, both on the surface and in the substance of a web of richly vascular connective-tissue, a multitude of large, epithelial cells, of which a large number were infiltrated with pigmentary granules; some had even lost all transparency, owing to the infiltration of pigment. Free granules of pigment were found in more or less abundance floating in the juice, and in less quantity in the tumour. The pigmented conjunctival spots showed no changes in the epithelium, save the presence of the granules of pigment. Considerable suppurative inflammation followed the operation, and some hypopyon was present, but these symptoms subsided, and at the end of three weeks the cicatrisation of the sclerotic was complete, but a large ulcer of the cornea remained. A suspicious "button" appeared at one edge of this ulcer, and was cauterised.

When the patient went out, the cornea in its outer two-fifths was vascular and partly cicatrised, the conjunctiva was very vascular; the iris was slightly discoloured, but the pupil was not adherent, though not very susceptible of regular dilatation; a fair amount of sight, sufficient even, according to the patient, for working.

In the course of the year he came to the "Clinique" many times, and the cure seemed radical and definitive.

DERMOID TUMOUR OF THE EYEBALL.

(*Communicated by Dr. Lebrun to the "Ann. d'Oculistique," Sept.–Oct.*, 1870, p. 135.)

A boy, aged seven, was brought on account of a small tumour of the left eyeball, which had existed since his birth. It was of the size of a pea, non-pedunculated, of a yellowish-red colour, situated at the sclero-corneal junction a little below and to the outer side. It was regular in form and of the consistence of a

lipoma. No hair could be discovered on its surface. One interesting fact was the presence, at the same level, a little above the tragus, and in front of the ear, of another dermoid tumour of slightly smaller size, and covered with fine hairs. The tumour of the eyeball did not increase in size apparently, but caused some constraint in the movements of the globe, and it gave rise to slight irritation of the eyelids. Moreover, it was a deformity. Removal was effected by taking hold of it with forceps and dissecting with a scalpel, the surface being afterwards cauterised. On examination, the tumour appeared to consist of fibro-cellular tissue without fat or glands, resembling the structure of the cornea and sclerotic. Nitrate of silver was applied to the granulating surface several times, and finally only a small whitish cicatrix remained on the cornea like that of a leucoma.

APPLICATION OF A LEECH TO THE EYE; CHRONIC CONSECUTIVE INFLAMMATION; SHRINKING OF THE GLOBE; SYMPATHETIC OPHTHALMITIS OF THE OTHER EYE; EXTIRPATION OF THE LOST EYE; IMPROVEMENT.

(*Communicated to the "Ann. d'Oculistique," Sept.—Oct.*, 1870, p. 136, *by Dr. Lebrun.*)

A man, aged 39, a domestic servant, applied on account of severe inflammation of the right eye. At the lower and outer margin of the cornea a triangular wound, unmistakeably a leech-bite, was detected; the pupil was displaced as after an iridodesis, and there was a considerable hypopyon which filled the lower part of the anterior chamber. The patient said that after suffering from irritation of the eye for some time, and after a practitioner had tried various remedies without effect, a leech was ordered to be applied to the inflamed part. The leech took hold far forwards and pierced the eyeball. What followed exactly can only be conjectured, but the border of the iris, corresponding to the bite, had disappeared and the pupil was displaced as if after an iridodesis, excepting that the iris and the deeper-seated membranes were strongly inflamed; the lens was not affected; the globe seemed somewhat softened. Although there had been no fistula, and in spite of treatment, a low form of inflammation of the deeper membranes persisted, the pupil became completely closed, and the globe was evidently wasting. In this condition he left the hospital, but was warned to return at once if the other eye became affected. In two months he came with the left eye so much affected that he could but just manage to do his work. He had in the mean time had many attacks of inflammation in one or other eye, but had been unable to show himself. The right eye was then greatly wasted and much congested. The left eye could scarcely bear exposure to light, watered considerably, and

was often painful. The cornea was perfectly transparent, the iris was not discoloured, was still mobile, but dilated with difficulty and irregularly; there was ciliary congestion, and the eye was too irritable to admit of ophthalmoscopic examination. The right globe was removed. Afterwards the sympathetic irritation of the left began to diminish, and finally disappeared, but, according to the patient, the amount of sight remained the same.

FOREIGN BODY IN THE IRIS.

(*Dr. Lebrun*, "*Annales d'Oculistique*," *Sept.—Oct.*, 1870, p. 137.)

A locksmith, while cutting a key with a chisel, was struck a violent blow on his right eye by a piece of iron. Three days later he came under the care of Dr. Warlomont, who recognised a foreign body, encysted in or on the iris, within the anterior chamber, at the lower and inner part. There was some hypopyon. An incision was made in the cornea and the foreign body removed. This could not be effected, however, without removing a portion of iris. The foreign body was about a line in length and half a line in width, and was embedded in the substance of the iris without having ruptured the lens capsule. The patient entirely recovered, and said that he could detect no difference in his sight.

TRAUMATIC DIVISION OF THE RIGHT INTERNAL RECTUS; DIVERGENT STRABISMUS; OPERATION FIVE YEARS LATER, STITCHING THE MUSCLE FORWARDS; RECOVERY.

(*Dr. Lebrun*, "*Annal. d'Oculistique*," *Sept.—Oct.*, 1870, p. 139.)

The patient was a woman aged 40. The eye diverged so much that when it was in a state of rest the outer border of the pupil was hid under the outer canthus. The external rectus was first of all divided, and then, some days later, an incision was made following the normal points of attachment of the internal rectus, and the conjunctiva dissected as far as the inner canthus, and then, the wound being held open, the capsule or the muscle itself was seized with forceps, far back. It was then detached from its recent points of attachment and brought forwards into its natural position, or even still more forwards, being retained by two points of suture. Notwithstanding the long time that had elapsed, the muscle had not lost its contractile power, but at the end of a few days seemed to act as well as the other. It is worthy of remark that the vision had never been affected, nor was there diplopia, owing undoubtedly to the extreme squint. No double vision occurred after the operation.

THE CO-EXISTENCE OF ANEURISMAL CHANGES IN THE RETINA, WITH ANEURISMS OF THE SMALL ARTERIES OF THE ENCEPHALON.

H. Lionville communicates a note on this subject to the "Gaz. des Hôp.," 1870, No. 36, p. 151, given in full in the "Ann. d'Oculistique," September-October, 1870, p. 169. We select the following points:—

The author has previously shown the co-existence of small (miliary) aneurisms of the small arteries of the various parts of the body with miliary aneurisms of the small cerebral vessels (aneurismal diathesis) and he argued then, that if aneurismal changes in the vessels were dependent on an alteration in the whole arterial system, rather than on a local lesion in this or that part of the body, these aneurisms, developed in connection with a general change, might be met with in some parts accessible to our investigation, such as the retina. The retina seemed to him, in fact, to be one of the organs which it would be easy and important to investigate for the detection of this general condition, and he expressed a hope that either during life or after death its examination would reveal important information. The object of the present note is to show that such information has been obtained.

In 1868 the author communicated the results of his investigations to the Biological Society.

The first case was that of a woman, aged 87, who had had (two years before) a sudden attack of right hemiplegia, without loss of consciousness; afterwards she suffered from dizziness, flushing of the face, and headache, and she died August 15, 1868.

The blood-vessels were found in places to be very atheromatous; there were well-defined aneurismal dilatations on the meninges, and numerous miliary aneurisms on the surface and in the interior of the brain, in the cerebellum, and the pons varolii. Examination of the right eye showed the retinal vessels to be very much dilated, gorged with blood, and tortuous; and in their course were found rounded dilatations, separate, and resembling aneurisms completely, which they were at once suspected to be, but this could only be proved on examination with a lens. The crystalline lens was opaque, otherwise, the author remarked then, these lesions might have been demonstrated by ophthalmoscopic examination.

In the following year MM. Bouchereau and Magnau showed some specimens to the Society, from a remarkable example of general aneurismal changes. The patient was a man aged 58, who drank excessively, was subject to epileptic fits, and died in one. At the autopsy there were found cerebral hæmorrhages, cerebral aneurismal dilatations, retinal hæmorrhages and miliary aneurisms and spinal meningitis.

A third case the author saw in conjunction with M. Charcot. The patient was 72 years of age, and had died after slight apoplectic attacks. The autopsy revealed innumerable miliary aneurisms, scattered throughout the brain, cerebellum, pons varolii, and the membranes. They were of all sizes, of different ages, and in many places corresponded with multiple, localised apoplexies, also of different ages. There were extensive arterial changes in various parts of the body, but also aneurisms were found in both retinæ. These aneurisms corresponded to small apoplexies infiltrated into the retina itself. Briefly, there were disseminated here and there, small zones of ecchymosis, of a rusty-yellow colour, surrounding rounded dilatations of the vessels, which could be made out very fairly with the naked eye, and could be distinctly demonstrated with a lens. Moreover, microscopic examination discovered others, which on simple inspection had not been recognised. Some required to be magnified 10 or 20 diameters before they could be recognised, whilst others were as large as a small pin's head, or as a tobacco seed, and one had attained the size of a small millet seed. In this case the lenses were clear, and an ophthalmoscopic examination might have been made.

ASTHENOPIA FROM SPASM OF THE MUSCLES OF ACCOMMODATION.

Fano records the following ("Gaz. des Hôp," 1870, No. 56, p. 222) :—

M. T., a mechanic, æt. 27, came under care on the 1st of December, 1869. He complained of inability to see when he tried to read; after having read about half a printed page, he only saw the print confusedly, the characters appearing to run into one another. In order to assure himself of the nature of the failure of sight, M. Fano gave him a page of ordinary print to read, making him hold the book on a level with his eyes. The patient read aloud, and it was agreed that as soon as his sight failed he should make a sign with his hand, without ceasing to fix his eyes on the page. This test showed manifestly, that, at the moment when his sight failed, when the printed characters ran into one another, on observing the patient's aspect, it was evident that, at that moment, the right eye turned towards the large angle of the orbit: that is to say, that a convergent strabismus was produced on that side. The same test, repeated after many days' interval, gave the same result. There could be no doubt, therefore, that the difficulty in seeing was the result of the deviation of the right eye inwards, depending on excessive action of the adductor muscle of this eye during binocular fixation. To remedy this condition, M. Fano proposed to the patient, who consented, that the right adductor should be divided. This

operation was performed on the 8th December. It was complete, that is to say, it comprised division of the whole thickness of the muscle.

After the operation, M. Fano ascertained that the patient preserved the power of directing the right eye inwards in as great a degree as before the myotomy. The latter was not followed by any untoward event.

On the 28th December, T. resumed his work, which he could execute easily. In the evening he began to read a few lines, but was obliged to desist.

On the 3rd January he announced that during the day he could read for three hours consecutively, without fatigue. In the evening fatigue was still as quickly experienced when reading, but even then the lines of print did not run into one another.

On March 7th T. showed himself at the "Clinique." The state of vision varied on different days; some days he could read for long, without being tired, and on others fatigue ensued rapidly. On causing him to read print aloud, and watching him the while, M. Fano ascertained that even when the sight became confused, the right eye no longer deviated. It was recognised, at the same time, that T. had become hypermetropic, for, instinctively, he placed the book at a distance of 18″. He was recommended to use No. 60 convex glasses ("Annales d'Oculistique," September-October, 1870, p. 172).

THE OPHTHALMOSCOPE IN THE TREATMENT OF EPILEPSY.

Dr. Reuben A. Vance writes upon this subject, in a pamphlet reprinted from the "N. Y. Med. Journ.," Feb. 1871. For the last two years he has been in the habit of mentally arranging his epileptic patients according to the intra-ocular appearances observable with the ophthalmoscope. Two well-marked groups can thus be formed; one group characterised by vascular fulness, the other by anæmia of the retina. It is well known that either hyperæmia or anæmia is competent to give rise to epileptic paroxysms, and the author thinks that bromide of potassium is of the greatest service in the former condition, and contra-indicated in the latter. He gives cases in which the ophthalmoscopic conditions were noted and the effect of the bromide observed. In all the cases of congestion a good effect was at once apparent upon the administration of the bromide, and in those cases in which the benefit was permanent, the circulation of the eye was brought into such a state as to indicate a natural condition of the cerebral circulation. Furthermore, as long as this natural condition was maintained, the fits did not recur, but when the drug was continued until an undue effect was produced, indicated by anæmia of the intra-ocular structures, the convulsions returned, generally with augmented violence. The effect of a series of con-

vulsions upon the intra-ocular circulation seemed to be to produce an increase in the size and tortuosity of the retinal veins. This might be supposed to indicate cerebral congestion, but, in one case, as the treatment progressed, anæmia, denoted by a diminution in the size of both arteries and veins, became more and more apparent, but upon the occurrence of several paroxysms, the veins assumed a dilated and tortuous appearance. The arteries, however, remained unusually small. The changed shape of the veins was clearly due to the commotion excited by the violence of an epileptic paroxysm. The author does not think that every case of epilepsy can be cured by attention to the state of the vessels, and treatment directed accordingly, but he is fully convinced that even the most unpromising case may be relieved and the patient's condition very much mitigated by systematic and careful attention.

TUMOUR OF THE BRAIN; CONGESTION PAPILLA.

Mr. Swanzy narrates a very interesting case in a pamphlet reprinted from the "Dublin Quart. Journ.," Feb. 1871.

The patient was a private in the Scots Fusilier Guards. On the 18th April previously he had fallen out of the ranks, faint, on a march, and was admitted into hospital. He was then in a heavy, listless state; complained of headache, giddiness, and much vomiting; his pupils were widely dilated. From this time, till Aug. 18th when the patient died, the general symptoms consisted in constant headache, frequent vomiting, great drowsiness and loss of memory, so that he often forgot having had his meals. If asked a question, it would be some moments before he would reply, and then his articulation was very slow but distinct. The bowels were very torpid, making the use of purgatives frequently necessary. His symptoms varied in intensity. At one time he was so far recovered as to be able to take a short walk in the barrack yard; but the next day he was obliged to return to bed. About a month or six weeks after his admission, Mr. Swanzy was asked (by Dr. Robinson) to see the patient. He found the pupils widely dilated, and in the left eye all power of perception of light was lost. In the right eye there was still a slight power of perception of light. The ophthalmoscope revealed that condition of the optic disc described by Von Graefe as congestion papilla. This led to the diagnosis of an increased intra-cranial pressure, dependent probably on the presence of a tumour within the cranium. The appearances much resembled those figured in Fig. 2, Table xi, of Liebreich's Atlas, and have been well represented (by Dr. Fitzgerald) in drawings taken during life. One accompanies the pamphlet. There was great tumefaction of the optic disc; the tumefaction was very prominent, but did not

extend far into the surrounding retina. The retinal veins were very much engorged and very tortuous in their course; they disappeared from view in some places at the edge of the tumefaction, where they were obliged, in order to reach the centre of the disc, to turn round the edge of the tumid part. This condition was produced by an increased intra-cranial pressure, the cavernous sinus was pressed upon, the return of blood through the ophthalmic vein was impeded, and the retinal veins became enormously congested. It was then not difficult to understand how, under these circumstances, a kind of venous strangulation occurred at the narrow and rigid optic entrance, through which the retinal veins have to pass out. A serous exudation occurred here, associated with the formation of cellular tissue, and hence the tumefaction. The autopsy fully confirmed the diagnosis. A tumour, as large as a moderate-sized apple, was found situated in the centre of the brain. It involved the convolution at either side of the longitudinal fissure in the middle and anterior lobes, extending laterally somewhat into each hemisphere, and reaching downwards as far as the corpus collosum, but not implicating it. The tumour was a sarcoma, with small, round cells, and in some places it had undergone fatty degeneration. The swelling of the optic disc could be well seen in the preparation of the posterior part of the eyeball. A woodcut of this is given. The pathological changes, in congestion papilla, do not extend up the optic nerve, but cease at the lamina cribrosa, thus differing essentially from the disease known as neuritis descendens, in which the morbid changes extend from the base of the skull along the nerve to the papilla.

RETINITIS PIGMENTOSA IN CONNECTION WITH INHERITED SYPHILIS.

The patient was a boy, aged $11\frac{1}{2}$, who came under Mr. Swanzy's (Dublin) care with imperfect vision of the right eye. There was external strabismus and nystagmus; the eyeball was somewhat smaller than the other. The iris was dull looking, its fibrillæ not being distinctly marked as in the normal eye. The pupil dilated well with atropine. The sight was much worse in the dusk of the evening. By good light the patient could read with this eye small words of No. 8 (Sn) at 6″ and CC at 15′, glasses making no improvement. The eccentric field of vision was unimpaired, for even with a very imperfect illumination he counted fingers in all directions. The left eye was slightly myopic, but its vision was nearly normal, and externally it appeared quite healthy. The ophthalmoscope revealed changes which have been admirably represented in an illustration published with the case by Dr. Fitzgerald. The disc was of a dirty grey colour, and its margin indistinctly defined. The veins were

normal, but the arteries were somewhat diminished. In the periphery of the retina were deposits of pigment in the form of numberless small dots and streaks. During six months that the case remained under observation, although these specks and streaks became more numerous and extended somewhat more towards the centre, yet they had no tendency to become confluent, or to form themselves into stellate or bone corpuscle shapes. They were not deposited along the course of the arteries; on the contrary, they appeared to avoid the vessels, and to occupy, by preference, the spaces lying between them. At one place only were there specks which lay over a vessel. On the apparent inner side of the disc were patches from which the choroidal epithelium had been removed, and at the periphery the atrophy had probably gone deeper. In the left eye there were also choroidal changes, but no retinal pigmentation had occurred.

The patient was of a sallow, earthy complexion; one upper incisor was very characteristically notched. When a fortnight old, he had suffered from ulcerations about the anus, &c. The family history was confirmatory of the diagnosis of inherited syphilis. The parents were not related. With the exception of one case of which Mr. Hutchinson has given an account ("Ophth. Hosp. Rep.," vol. v, p. 324), and which is reproduced, Mr. Swanzy has been unable to meet with any details of similar affections. He publishes a letter from Mr. Hutchinson, confirming the diagnosis in the present case, and in which it is stated that the writer had seen several others more marked than the one he had published, and the diagnostic points are thus given:—"The rapidity with which the changes advance, and the early age at which the blindness is brought about. The changes are seldom symmetrical, or, at any rate, the two eyes rarely suffer in like degree. The pigment is often in blots or round specks as well as in lines and stars. There is often evidence of disease of the choroid as well. The pigment is more often irregular in its arrangement than in the more characteristic cases not due to syphilis. Still I have no doubt that inherited syphilis is not unfrequently the cause of affections which are spoken of as retinitis pigmentosa." Mr. Swanzy points out the symptoms which differentiated his case from an ordinary retinitis pigmentosa, as the shape of the deposits, their localisation apart from vessels and the absence of concentric contraction of the field, which is so common in the usual form (Pamphlet "Ophthalmic Notes," reprinted from "Dub. Quart. Journ.," May 1871).

DERMOID TUMOUR OF THE CORNEA.

Mr. Swanzy, in his "Ophthalmic Notes," reprinted from the "Dub. Quart. Journ.," May 1871, gives details of a case, with a lithograph of the appearances presented. The case was observed at

the hospital of the late Prof. von Graefe in Dec. 1869. Notes of the microscopical appearances are given by Dr. Leber, who had prepared them for von Graefe's use. The tumour was very large. It consisted of two portions, an anterior one of the size of a large cherry, and a posterior one less than half the same size. The two segments were connected by a narrow band. This peculiar shape was probably due to the constriction by the eyelids *in utero*. A few fine pigmentless hairs could be detected by the aid of a lens on the surface. Von Graefe removed the tumour. It occupied the whole depth of the cornea, and the globe was opened, a considerable portion of the vitreous escaping. The crystalline lens could not be found, and was thus shown to have been congenitally deficient. Microscopically, the tumour consisted of an external cutis-like layer, and beneath this of a thick layer of fat tissue, of which, in fact, the great mass of both segments consisted; and this tissue differed in no way from the usual subcutaneous fat. The cutis-like layer was formed of a superficial epithelial covering and of a layer of cellular tissue containing hair follicles, and very beautifully developed sudoriferous glands, the latter extending as deep as the fat tissue. There were few papillæ, and these were imperfectly developed. On the other hand, in some places, numerous and tolerably large vessels were observed. It was with difficulty that some minute rudimentary sebaceous glands were discovered in connection with the hair follicles, but the ordinary acinous, sebaceous glands were not present. The cornea, as such, was quite absent, but a thin layer of fibrous tissue, which occupied an analogous position, might be supposed to take its place. It could not be ascertained whether the tumour had caused arrest of development in the cornea, or whether the latter had been gradually destroyed by the growth of the tumour. A rudimentary iris lay close to the pseudo-cornea behind, so that there could have been no anterior chamber. Concerning the size of the globe, it was not possible to form an exact estimate, for it was at first so concealed by the tumour, and after the operation it became collapsed. It did not appear, however, to differ much from the normal size. That the name of dermoid is properly applied to this tumour, is evident from its minute structure. There is no reason why such tumours should not grow from the cornea as well as from the ovary, &c., but in the present case the deficiency of the lens suggested to Mr. Swanzy the query as to whether the invagination of the cuticle which usually occurs for the formation of the lens had not in this case been replaced by a bulging outwards. If so, the lens would not be formed, and there would have been no difficulty in imagining how such a growth as this may thus have had its origin. Ryba believed many of these cases to originate in arrested development of the eyelids. The eyelids were quite normal. Manfredi has published a case with microphthalmos,

but in this case there was no evidence of imperfect development of one part more than of another.

AN AFTER DANGER OF PERIPHERAL PROLAPSE OF THE IRIS.

Mr. Swanzy narrates three cases in which acute inflammation of the eyeball followed after slight injury, and in which there existed peripheral prolapse of the iris in consequence of a former injury. The first patient was a man, aged 40, admitted for purulent iritis of the right eye, attended by agonizing pain, of two days' duration. Twenty years before, the patient had received a perforating wound of the sclerotic, to the outside of the cornea, and distant about half a line from it. Prolapse of a portion of the iris into the wound occurred at the time. He had had no further injury, and the eye had not been troublesome till a few days before. He had been much exposed to the weather, and had had much fatigue. In spite of the treatment adopted, the eye became utterly lost.

The second patient was a man, aged 30. Eight months before, he had received a perforating wound of the right eye to the outside of the cornea, in the sclero-corneal junction. A portion of iris prolapsed into the wound. The eye had given the patient no trouble, and vision had been perfect. The day before admission, without any wound, or other immediate cause, the eye became irritated: towards evening this irritation became increased, and great pain set in. The next morning purulent iritis had already set in, and could be seen to be most intense towards the point of incarceration. The whole iris had, however, assumed a yellowish hue, and the aqueous humour was opaque. The perception of light was good. The eye became rapidly phthisical, and it was soon necessary to enucleate it in consequence of its fellow becoming sympathetically irritated.

The third patient was a man, aged 27. Ten days before, he had received a slight blow from the hairs of a horse's tail in this eye while stooping. He experienced much pain during the remainder of the day, and by the next day the eye was quite blind. On examining the eye, the pupil was found very much displaced upwards, in consequence of an old prolapse of the iris into an ulcer, at the upper sclero-corneal boundary. The great distension of the eyeball had now caused the cicatrix to gape. In the left eye there existed a similar condition of the iris and cornea. Two years before he had had an acute conjunctival blenorrhœa in both eyes, which had been the cause of the ulcers. In case 2, it was evident the inflammatory process originated in the iris at the place of incarceration. In case 1, the suppuration had advanced too far to make certain of this. In case 3, such an injury would never produce an inflammation of this kind in a healthy eye.

It would seem then—*a*. That the presence of a peripheral

prolapse of the iris renders the eye always liable to be suddenly attacked by a purulent iritis *foudroyante; b.* That the immediate exciting cause may be very slight, or even not discoverable; and *c.* That, in consequence of the great rapidity of the process, the prognosis of these cases is of the worst. It is not easy to understand why peripheral prolapse should expose an eye to such a danger. Is the proximity of the ciliary body somehow in play? It cannot depend on the tension and dragging of the iris, for in case 1, this was *nil.*

(Pamphlet reprinted from the "Dublin Quarterly Journal," May, 1871.)

RETINITIS PIGMENTOSA.

Mr. Thomas Windsor narrates the following case:—A gentleman, aged 30, complained that for some four or five years he had been unable to see, excepting in a good light. He could read during the day time with his right eye, when provided with + 12, No. 1, Jäger, from $3\frac{1}{2}''$ to $10''$, so that his central vision and power of accommodation were both good. An examination of the field of vision revealed a peculiar fact; measured at $14''$ distance by moderate gaslight, there was a small central portion extending $10\frac{1}{2}''$ horizontally, and $8\frac{3}{4}''$ vertically, in which he recognized a small piece of chalk; then, towards the temporal side, there was a space, $6\frac{1}{2}''$ wide, in which he still saw the movements of a hand; this was followed by an interval $13''$ wide, corresponding to which the retina was absolutely void of percipient power, and this, again, by another more than $27''$ wide, in which the *chalk* was again perceived. On the nasal side, the central field, in which the chalk was seen, was bounded by a sharply defined line, beyond which nothing could be seen for the distance of $10\frac{1}{2}''$, when again there was a space $4''$ wide, in which the *chalk* was well perceived. The opthalmoscope showed, in the corresponding portion of the fundus, a zone of pigment spots, with multiple processes, just as in typical cases of retinitis pigmentosa. Within this zone the reflex of the fundus was of a reddish-grey colour, whilst at the outer side it had its usual red appearance. The disc was somewhat white, and the central vessels were rather small; there was around the disc a largish white ring, over which the smaller vessels made a very distinct bend. The principal colours were still recognized, though not, perhaps, so readily as by a normal eye. No cause could be assigned; his general health was good; he was tall, robust, and of good colour. He had smoked since the age of 13, and much since he was 18. His parents were not related. An able summary of published opinions and cases by Græfe, Mooren, Donders, Müller, Schweigger, and Leber is given, and then the author sums up to the effect that (1) in some, probably in many cases, the disease commences, and is probably located in the outer layers of the retina. That

(2) the disease is probably inflammatory in its nature, and that the inflammatory or nutritive processes in the adjacent portion of the choroid, the inner layers of the retina, the optic nerve, the vitreous, and the lens are secondary.

(Pamphlet reprinted from the "Manchester Medical and Surgical Reports," vol. i, 1870.)

ALBUMINURIC RETINITIS.

Dr. Argyll Robertson publishes a pamphlet on this subject, reprinted from the "Edinburgh Medical Journal," January, 1871. Until comparatively recently, defect of sight accompanying kidney disease was invariably attributed to uræmic poisoning of the nervous system. Now, although this is occasionally the case, as a rule the defect is due to organic retinal lesions. The symptoms are quite distinct (Græfe). Where the dimness of sight is due to uræmia, the amaurosis occurs, suddenly, reaching its height in several hours—in some cases in a few minutes—and the blindness is not unfrequently complete. Resolution occurs equally rapidly. In the other form, the sight may also become pretty rapidly impaired at the commencement, but thereafter progresses more gradually, and after increasing for several days remains stationary for a longer period. Very seldom does absolute blindness occur. Resolution, too, when it does occur, proceeds very slowly. Dr. Robertson then gives an account of the different appearances described by various authors, and the different opinions broached as to their causation. He details five cases which have occurred in his own practice.

The first patient was a woman, aged 17. The defect of sight had been noticed three weeks. There had been no general symptoms of kidney disease. On ophthalmoscopic examination, marked changes due to albuminuric retinitis were found. The urine was highly albuminous. She died, after some time, in an unconscious state, preceded and accompanied by convulsions of an epileptic character. No post-mortem was obtained. The second patient was a man aged 49, who for eleven weeks had suffered from vomiting, pains in the head, &c., copious micturition, and great thirst. Changes in each retina were found, and the urine was highly albuminous. He died in about five months with uræmic symptoms. The kidneys presented characteristic appearances of the contracting form of Bright's disease. The third patient was a male. Kidney disease had been previously diagnosed, and his symptoms dated back for two years; chiefly periodic headaches and vomiting. The fourth patient was a man aged 40, affected with chronic Bright's disease. The patient died, and waxy degeneration of the kidneys, liver, and spleen was found. A comparatively rare complication. The fifth patient was a man aged 28. His symptoms dated for two years;

œdema of the ankles, &c., and frequent micturition. He exhibited severe uræmic symptoms, but recovered for a time. A recurrence followed, and he died in a few weeks. The author summarises as follows:—1. That dimness of vision is a frequent concomitant of chronic Bright's disease; and that while in a few cases the defective sight may be attributable to uræmic poisoning of the nervous system, in the great majority of cases it is due to inflammation of the retina, attended with fatty degeneration.

2. That this disease of the retina presents such distinctive ophthalmoscopic appearances as enable it to be at once, with certainty, recognized.

3. That this retinal affection is found most frequently to accompany the contracting form of Bright's disease, but, occasionally, also, the amyloid variety.

4. That not unfrequently, from the insidious progress of the disease, the affection of vision is the first symptom that obliges the patient to apply for advice, and that thus the ophthalmoscope may lead to the detection of previously over-looked kidney disease.

5. That, in a few cases, the diseased condition of the retina has been resolved, with restoration of function.

MELANOTIC CANCER OF THE FRONT OF THE CORNEA.

Dr. Hirschberg relates a case of polypoid, melano-carcinoma of the front of the cornea. V. Græfe was to have furnished the clinical details, as the case was under his care, but his lamented death prevented his doing so. Dr. Hirschberg speaks, therefore, from recollection only. The patient was a countryman of about fifty years of age, vigorous, and apparently in good health, who applied on account of a peculiar growth in his left eye of polypoid aspect, as black as ink in colour, and of the size of the knuckle of a finger. This projected forwards from between the lids, and, on account of its strange appearance, gave any one who had not seen it before an impression, at the first glance, that it was a foreign body rather than an organised structure. It was, however, firmly fixed to the cornea by a broad base, and did not allow the deeper parts of the eye to be seen. There were also found, on the ocular conjunctiva, two small, slightly prominent, black spots, and, on the reflected portion, there was also one dot, looking like a grain of snuff.

The tumour was removed by Prof. v. Græfe at the level of the cornea. It did not involve the deeper parts of the cornea, but passed somewhat into the middle of the sclerotic near the cornea. Every part was carefully removed, not excepting the little melanotic growths of the conjunctiva. The patient recovered well and quickly. The globe itself was intact. The amount of vision which was left was proportionate to the corneal

opacity. The chief tumour was about the size of a finger knuckle, and was fixed to the upper and inner part of the sclero-corneal margin, and to the greater part of the cornea, by a base 10 mm. (·4″) in diameter; in the direction of the axis of vision it projected 12 mm (·48″); from above downwards it appeared somewhat flattened; in front of the palpebral fissure it spread out in an almost even surface 18 mm. (·72) in breadth and 8 mm. (·32″) in height. The colour of the tumour was as black as ink on the side, on the anterior limiting surface, covered with a dry crust and slightly bloody, and on the cut surface at the base where the tumour had been removed from its source of origin. Only here and there, in the thin covering of connective-tissue, a few, small, white (fibrous) spots were seen. On the hinder cut-surface also the deep tint changed into a more greyish-black and striped shade.

The growth was of very soft consistence, each surface being moistened with "cancer juice." Teazed-out preparations, examined microscopically in a simple fluid in the recent state, showed that the tumour was made up (besides numerous blood-vessels and fibres of connective-tissue) of pigmented cells, showing all varieties of size, shape, and shade of colour. Irregular, polyhedral, or roundish cells, about 0·01 mm. (·0004″) and upwards in diameter, and for the most part flattened, were especially numerous, and resembled, to a great extent, those of the choroïdal epithelium. In the centre was a clear spot, resembling a nucleus, whereas at the periphery there was a dense collection of pigment granules. Where the pigmentation was only slight, the central nucleus could be distinctly seen, about 0·006—0·008 mm. (·00024″ ·00032″) in diameter, as long as the cell lay on its flat side, but when the latter rolled over, presenting its edge to the observer, the nucleus disappeared. Besides these there were large and small, roundish, oval, spindle-, club-, pear-, and retort-shaped cells, showing great variety of shades of pigmentation; some having a well-marked nucleus, others none at all. Large, pigmented spindle-cells were seldom met with.

In addition, there were also spherical, spindle-shaped, and irregular cells, wholly free from pigment, sometimes of fairly considerable size, 0·02 mm. (·0008″) in diameter and upwards, with a nucleus of 0·009 mm. (·00036″). The pigment granules appeared, when more highly magnified (Hartnack's immersion No. 9), as round, yellowish granules, almost of the tint of "red" blood corpuscles, and of about 0·0005 mm. (·00002″) in diameter; although in many of the cells single large ones occurred of the diameter of 0·0036 mm. (·000144″). The first of these closely resembled the size of the pigment granules of the cells of the lamina fusca; the latter, those of the choroïdal epithelium, according to Rosow (v. Græfe's Arch. ix, 2, 65).

The micro-chemical examination gave the following results:

—1. In weak potash solutions the pigment disappeared, showing analogy to hæmatin rather than to the so-called melanin; so that five fine slices, of the colour of ink, after soaking in a solution of potash (official) diluted with equal parts of water for 24 hours, became brown, and, after 48 hours, became yellow. Microscopic examination of these bleached slices showed that a large part of the cells had disappeared under the influence of the reagent: that in the remainder the pigment molecules had either wholly or in part vanished, or at any rate been much changed, and that of the protoplasm only an extremely fine, pale dotting could be recognized. 2. The addition of aqua chlori to the potash solution, with exclusion of the air, clearly accelerated the bleaching process, somewhat, but not materially. 3. Concentrated hydrochloric acid produced similar changes, but not any more quickly than the potash solution. 4. With the assistance of Herr O. Liebreich, it was demonstrated by Perls' test that the pigment contained iron.

Pencilled out sections of the tumour, after it had been moderately hardened in weak Müller's solution, showed that the structure of the tumour was of the alveolar type. With a low magnifying power, small and large roundish or oval spaces could be seen, from 0·06—0·12—0·24 mm. (·0024″—·0048″—·0096″) in diameter, bounded by septa of connective-tissue, 0·03—0·06 mm. (·0012″—·0024″) in breadth; sometimes completely, sometimes incompletely pressed against one another, and distended with heaped up, intensely black masses, which either partly covered up the margins of the septa, or were situated at a little distance therefrom. Here and there they had wholly fallen out of the alveoli. The black bodies appeared, under higher magnifying power, to be composed of pigment cells, of the form described above, closely pressed together, without any intercellular substance, mostly flat, and showing here and there a nucleus. The septa consisted of fibres of connective-tissue, arranged in bundles, and lying amongst them were widely separated oval or round nuclei. The general arrangement of the septa and intervening masses exhibited some resemblance to a hepatised lung, and especially so to a lung infiltrated with melanosis. The resemblance between the structure of a cancer and that of a hepatised lung was first pointed out by Virchow (Arch. Bd. 1, hft., 1, S. 95). In many of the preparations a decidedly nævus structure was visible, which occupied half the area of the section, and consisted of large and small strongly refracting blood-vessels, passing lengthwise and diagonally.

In addition to the chief tumour above described, there were obtained from the ocular and palpebral conjunctiva three roundish, melanotic, and slightly prominent patches (secondary collections). 1. From the upper part of the ocular conjunctiva a black speck, 2 mm. (·08″) in diameter. 2. From the same

situation a larger patch of a brownish black colour, 8 mm. (·32″) in length, and 3 mm. (·12″) in breadth. 3. From the reflected portion of the conjunctiva a black dot, scarcely $\frac{1}{3}$ mm. (·013″) in diameter. The undercut surfaces of all the conjunctival portions were uncoloured. Sections through the thickness of the first speck showed a collection of pigment cells in the lower layer of the epithelium, whilst the conjunctival and subconjunctival tissues showed no noticeable changes. At the border of the speck the epithelial covering did not measure 0·06 mm. (·0024″), and gradually thickened towards the middle, with a slightly wavy surface, to as much as 0·21 mm. (·0084″). So also the thickness of the layer of pigment cells increased from the circumference to the centre, from 0·018 mm. (·00072″) to 0·15 mm. (·006″), therefore relatively thicker than that of the whole epithelial covering, and consisted in the first part of 2—3, in the last part of more than 20 layers of cells, somewhat irregularly placed one over the other. The inferior boundary line of the pigmented layer had a fairly straight course; the upper, on the contrary, was irregularly zig-zag; there were also in the upper, clear layer of epithelium, single, thickly pigmented constituents, and in almost all the cells there were at least single granules of pigment, and not infrequently they were arranged in a ring or crescent around the cell-forming nucleus. No special limiting membrane between the epithelium and conjunctiva could be made out. Single pigment cells (chiefly spindle-shaped) were clearly seen to lie amongst the uppermost fibrils of connective-tissue, and even to lie under the most superficial capillaries. The pigment layer was, however, essentially epithelial.

It is well known that pigmented cells are found in the epithelium of the conjunctival border, not merely in many of the lower animals, but also in many men (brunettes) as a normal condition. Further, there are present in the human conjunctiva, not very infrequently (and even in young individuals), large and small, brown, slightly prominent, fairly stationary patches, single or multiple, and chiefly situated at the sclero-corneal junction.

It is interesting that these innocent formations should represent in size and other respects the same structure as the small secondary deposits of melano-carcinoma; they owe their colour solely to a stronger pigmentation of the deeper layer of epithelial cells. This was found to be the case in a piece of conjunctiva (a line in length) removed by v. Graefe from a young girl; and also in a small speck, like a grain of snuff, which was excised from the right caruncle of a boy 15 years old (a brunette).

The foregoing case was very similar in the structure of the growth, but not in its clinical aspect, to one recorded by Langhans (Arch. Bd. xlix, S. 117). With reference to the literature of the subject of the new growths occurring at the sclero-corneal margin of the human eye, reference is made to Virchow

(Onkol. ii, 284); Hirschberg ("Medullary Fungus of the Retina," S. 82), and (Wiener Med. Rundschau, ix, iii, i, July, 1870); Classen (Arch. Bd. L. S. 56); and the author merely states that, apart from single dermoid tumours, melanoma simplex, &c., sarcoma (white and black) as well as epithelial cancer and melano-carcinoma have been met with. (Pamphlet reprinted from Virch. Arch. Bd. 51, with illustrations.)

REGENERATION OF THE EPITHELIUM OF THE CORNEA.

Following out some experiments of Arnold, of Heidelberg (noted in Virch. Arch. Bd. xlvi), Dr. O. F. Wadsworth, of Boston, and Prof. C. J. Eberth, of Zurich, have made further investigations by acting on the cornea of frogs with cantharides or collodium. If cantharides be dropped on the cornea of a frog, the epithelium affected becomes immediately opaque, and after a short time may be removed as a continuous membrane. The authors prefer collodium as exciting less irritation. The cornea was then soaked for one or two minutes in a solution of one-fourth per cent. of nitrate of silver. By this means the dead epithelium was made to disappear, and the boundary line of the living epithelial tissue made distinct. A finely granular substance is afterwards seen in most cases to fill up the loss of substance in the cornea. According to Arnold this gives place to a homogeneous protoplasm, out of which the new epithelium arises.

The authors find it difficult to reconcile this assertion with the sharp boundary of the epithelium towards the granular substance. They have found, in the hyaline protoplasm, free nuclei and nucleoli, as Arnold states, but much more frequently with cells, on the immediate edge of the epithelium, which contain peripherally situated nuclei in process of division, but no free nucleoli. They consider that the epithelium grows at the edge of the loss of substance by increase in size and division of the marginal cells. The growth would seem, however, not to be limited to the margin alone, but also to take place in the continuity of the epithelium.

The process of nourishing the cornea in the lymph space under the skin of the frog, after the epithelium had been removed from a small space by the knife, gave them no satisfactory results. Arnold stated that islands of epithelium generally died. The authors came to the same conclusion when following out Arnold's plan, but by scratching the cornea with a sharp lancet in such a way as to leave islands of different shapes which have not been affected by any reagent (as was the case in previous experiments), they arrive at different results. Even small islands of epithelium, although situated at a considerable distance from the vascular system, continue to live. They produce new epithelium, even if somewhat more slowly than the epithelium remaining after central loss of substance; and the regeneration always takes place from the

epithelium, which had remained toward the defect. That amœboid cells take part in the new formation they were unable to show. They made some experiments to try and prevent growth from the periphery after removal of epithelium. An epidemic among their frogs necessitated a conclusion earlier than they intended. (Pamphlet reprinted from the Boston Med. and Surg. Journ., vol. vi, No. 8, with eight illustrations.)

IDIOPATHIC WASTING OF EYEBALL.

Mr. Swanzy narrates a case in the "Annales d'Oculistique," Nov.—Dec., 1870, p. 212. He remarks that the name "essential phthisis bulbi" was applied by Prof. v. Graefe (Arch. für Ophth. xii, 2, p. 256) to a peculiar affection, of which the chief symptom is a sudden and considerable reduction of the tension of the eyeball, and is followed by a gradual return to the normal condition. There are no pathological changes at all to be detected in the interior of the eyeball. Only two cases have hitherto been published—the first by v. Graefe (l. c.), the second by Nagel (Arch. xiii, 2, p. 407). Von Graefe's patient was a countryman who had received a blow from the hoof of a goat, which had caused a small conjunctival cicatrix and occlusion of the inferior lacrymal canal. Nagel's patient was an individual on whom he had performed strabotomy. The present patient was a woman, æt. 37, on whom v. Graefe performed double cataract extraction on May 24, 1869. From the comparative youth of the patient, v. Graefe diagnosed some affection of the vitreous, and expected loss of vitreous at the operation. A notable quantity did escape from each eye, causing decrease of tension, which, however, in forty-eight hours completely passed off. There was no sugar in the urine. The patient did well, with the exception that in the wound of the left eye a semi-transparent substance was formed, such as in other cases, however, had caused no trouble whatever. As the patient had lost vitreous, she was kept in the dark for three weeks; access of light being then followed by irritation, the room was again darkened. On July 5th (six weeks after the operation) she complained of a feeling of fulness of the left eye, and she saw less distinctly with it. There was a small hæmorrhage in the anterior chamber. The tension was diminished (— T 3). The patient said she had not hurt herself, and as she was a very sensible woman the suspicion of a traumatic cause had to be dismissed, unless she had given herself a blow in her sleep. There were no other external symptoms to be detected. With the ophthalmoscope a large number of floating bodies were found in the vitreous; no other changes. The next morning (the 6th) there was a manifest improvement in the tension. In the evening it was only — T^2. The hæmorrhage in the anterior chamber had disappeared. On the 8th the tension was normal, and

there were no ophthalmoscopic changes. On the 9th the tension was about $-T^2$. By the 12th it had again become normal. On the 16th it was diminished; on the 17th, in the evening, had become normal, and remained so till the 23rd, when it was as low as $-T^3$, and remained so till the 27th. It then varied till the 31st, when it became normal, and remained so. On the 4th August the patient returned home. The tension was then normal. There were some floating bodies in the vitreous but no changes in the fundus, and the amount of vision in both eyes was the same. A letter from the patient's husband was received after a while, and it was stated that fifteen days after her return her eye became worse than it had ever been whilst she was at Berlin. She remained quietly in bed, and quite recovered. The author remarks that the most remarkable feature in this case, and in which it differed from the other published cases, consisted in the absence of any alteration in the shape of the eyeball. In both these an unevenness of Descemet's membrane was noticed, and a flattening of the globe in the situation of the recti muscles. In this case the cornea was clear, the pit produced by pressure of the finger was quickly effaced, and there was no neuralgia. The only persistent symptom complained of was a sense of fulness. This might be explained by the pressure on the ciliary nerves by the choroidal vessels engorged in consequence of the vacuum produced by the reduction of tension. Such an explanation would also account for the hæmorrhage into the anterior chamber, proceeding from a vessel supplying the iris. The cause of the changes in the tension was probably nervous. It could not depend on reflex irritation of the fifth, as the experiments of Donders (and others) have shown that this produces increase of tension. Irritation of the sympathetic produces decrease of tension. Unless we admit a primary central irritation of the sympathetic this will not help us, for we know of no means of reflex irritation by which the loss of tension could be produced. One other difficulty would still remain, to account for the condition of the vitreous. One cannot understand how so large a quantity of this could be absorbed and reproduced so quickly as to account for the rapid changes. Dr. Gouvéa has established by his experiments, and Prof. Iwanoff has confirmed the fact recently (Arch. f. Ophth.), that in all cases of extraction of cataract, accompanied by loss of vitreous, the latter separates from the retina and the intervening space becomes filled with a serous exudation, the vitreous not being reproduced. If this was what occurred in the above case, then there would be no difficulty in accounting for rapid changes in the amount of fluid within the eyeball. Separation of the vitreous may occur idiopathically and does so not infrequently, and, further, is compatible with a very satisfactory degree of vision. It is not improbable that an analogous separation occurred in the two cases previously recorded.

TANNATE OF LEAD IN THE OPHTHALMIA OF CHILDREN OF LYMPHATIC DIATHESIS.

Dr. Martin Schœnfeld advocates the employment of tannate of lead in a form of ophthalmia occurring in lymphatic children, probably a variety of strumous ophthalmia. Out of 585 persons who attended at his dispensary, 285 were children affected with this kind of ophthalmia. He uses the tannate of lead in the form of an ointment. The lead should be rubbed up in a mortar with some oil of sweet almonds or olive oil, as it sticks to the side unless this is done. A drachm and a half of the tannate is rubbed up with three drachms of oil and a drachm of fresh lard is added, the whole being well mixed. The ointment may be applied between the eyelids, or outside them, and is useful in ulceration of the cornea, as well as in ophthalmia and various other conditions ("Annales d'Oculistique," Jan.—Feb., 1871, p. 5).

DEFECT OF SIGHT IN LEUCOCYTHEMIA.

M. Maurice Perrin (Soc. Imp. de Chir., 30th March, 1870) has called attention to the defect of sight met with in a case of leucocythemia. The patient complained of a mist before his eyes. The field of vision was contracted from the periphery to the centre, principally on the left side. Ophthalmoscopic examination showed the fundus covered with effusions of blood, or with small hæmorrhagic spots of a bright red, resembling the intestinal villi injected and contrasting with the chamois-yellow of the fundus. Post-mortem examination verified these appearances, but the colour of the blood had become brownish ("Annales d'Oculistique," Jan.—Feb., 1871, p. 69).

OPERATION FOR ENTROPION.

M. Durand describes a modified operation for entropion ("Gaz. Méd. de l'Algerie," 1870, p. 74). Having closed the patient's eye, trace a line with ink or nitrate of silver transversely across the eyelid, dividing it into two parts. (This line is not, however, indispensable.) Pinch up a fold of skin of this eyelid between the two first fingers of the left hand, and by a gliding movement push back the tarsal cartilage. Take a pin in the right hand and make it traverse the base of the fold of skin still held by the left hand, in such a manner that its point of entrance shall be on the black line which was traced, and its point of exit on the line of eyelashes, or as near to it as possible. Insert two other needles, one on the inside, the other on the outside of this one at a distance of four lines from one another. Wait till the fold of skin be a little swollen, and then remove it with scissors.

A twisted suture should then be used in such a manner that as the thread brings the lips of the wound together it will also bring the two outside needles nearer to the middle one. The lower eyelid should be protected by a piece of strapping. After three days the suture may be removed. The operation leaves no visible trace, and the presence of the pins guards the tarsal cartilage. A case is narrated. Dr. Warlomont remarks that this operation is not new, but it offers a very important modification. The excision of a portion of the lid has often been practised in similar cases, but in an uncertain manner, sometimes too much and sometimes too little being taken. The surgeon can shape the piece removed at will, and thus raise the eyelid as much as he wishes. The cut of the scissors is made with precision, the eyelid not being stretched, and lastly the two lips of the wound are brought together very regularly ("Annales d'Oculistique," Jan., Feb., 1871).

DEAFNESS IN RELATION TO VASCULAR KERATITIS AND CONICAL INCISOR TEETH.

Dr. Davidson communicates a paper on this subject to the "Annales d'Oculistique" (Mars–Avril, 1871, p. 125). The greater part of the cases occurred in subjects between the ages of 11 and 16. None were younger than 8 or older than 18 The greater number were of the lower class, ill-lodged, ill-clothed, ill-nourished, and exposed to bad atmospheric conditions. The only exceptions occurred in individuals suffering from some uterine disorder or legitimately suspected of syphilitic impregnation. The place of habitation exercised a great influence on the development of the malady. Nearly all the patients came from the sea-shore, and especially from situations exposed to the east wind, which entails as nearly constant effects, dampness and extreme cold, continuing severely nearly the whole winter. With the exception of one case, that of a boy 8 years old, all the patients were girls. This circumstance, joined to that of the particular age of the patients, leads to the question whether the development of the genital organs has not a great influence. Two cases are cited in support of this hypothesis. The first is that of a young woman of 16, in whom an accidental suppression of the menses was followed by laryngitis, accompanied by head symptoms, which disappeared unexpectedly at the same time that an affection of the cornea and deafness supervened. With appropriate treatment the constitutional symptoms diminished and the health became re-established, the cornea however remaining so opaque that the patient could not see her way about, and the hearing was affected so far that she could only hear a watch at an inch distance on one side and on absolute contact on the other side. A local and constitutional treatment with mer-

cury was adopted, the result being that the corneal opacity of the right eye diminished sufficiently to allow of a large iridectomy being performed. The effect was excellent, and, most remarkably, as the sight improved so also did the hearing on the same side; a watch could be heard at eight inches. The same treatment being adopted with reference to the other eye was followed by the same improvement, and the patient was able to resume her occupation, that of a seamstress. The second patient was 15 years of age. She was suffering from amenorrhœa. On one side a watch could not be heard at all, and only on absolute contact on the other side. Mercurial treatment and iridectomy having been adopted was followed by the same success as in the other case. With reference to the aural changes, it is stated that in some of the cases only was the Eustachian tube affected; in all the membrana tympani was involved on both sides. In the first period the membrane, more vascular than ordinary, was of a rosy-grey colour. In some cases this vascularity extended further into the auditory canal, and probably a similar condition of the Eustachian tube existed at its internal or tympanic opening in those cases in which it was affected. Later the redness vanished, but the membrane remained thickened, became of a white colour, dull and void of elasticity. As it did not admit of being set in vibration by the undulations of the air, it resulted that the hearing was defective.

Just as iritis nearly always exists in connection with the corneal affection, so also the Eustachian tube is very frequently involved. The change not being limited to congestion, but consisting in effusion diminishing the calibre of the tube, and was in proportion to the tympanic symptoms. The prognosis is always unfavourable. The case in which indectomy was followed by almost complete recovery of the hearing must be looked on as a fortunate coincidence. The syphilitic origin of this curious affection could only be established in 20 per cent of the cases.

EMPLOYMENT OF ALUMINIUM PLATES PLACED BETWEEN THE EYELIDS AND THE EYEBALL.

In the "Annales d'Oculistique" (Mars—Avril, 1871, p. 188) is a note by Dr. G. Albini on the use of metallic plates in the treatment of staphyloma, &c., placed between the eyeball and the lids. Pressure is kept up by means of a bandage. The good effects which he met with induced him later to employ a plate perforated with a small hole in cases where one part of the cornea was still transparent. The hole, being placed over the transparent part of the cornea, answered perfectly. Aluminium was chosen because of its lightness, its malleability, and its hardness. On account of its fusibility it will not take colours so as to make

artificial eyes of it, but the author hopes to overcome this difficulty by-and-bye. According to M. Albini, one can profitably use the plates under the following circumstances:—(1) To protect the ocular conjunctiva from caustic remedies and as a means of employing pressure (in trachoma, &c.) on the inner surface of the eyelids. (2) To protect the ulcerated cornea and favour cicatrisation. (3) They can be used as substitutes for artificial eyes without previous operation, and might be used instead of glasses by inserting small quartz lenses in holes in the plates. (4) They can be used to direct electric or thermal currents over the eyes.

PIGMENT OF IODINE AND MORPHIA.

M. Warlomont recommends a pigment composed of iodine and morphia to be painted around the orbit and on the temple to relieve pain in eye affections. The painting is repeated morning and evening, or oftener. When the epidermis peels he applies a rice poultice. The paint consists of about three grains of acetate of morphia (20 centigrammes) and a drachm of tincture of iodine (4 grammes).—"Annales D'Oculistique," Jan.—Fev., 1871, p. 91.

LANCE-SHAPED KNIVES FOR IRIDECTOMY.

M. Warlomont prefers lance-shaped knives (modifications of M. Weber's) for iridectomy. Figures are given. ("Ann. D'Ocul.," Jan.—Fev., 1871, p. 93).

MEANS OF WITHDRAWING PINS USED FOR SUTURE.

In order to avoid the traction which is generally made on the edges of a wound while withdrawing pins, M. Warlomont adopts a plan mentioned to him by M. Desmarres. He throws a loop of thread over the end of the needle by which he means to make traction, then drawing on the needle with one hand he steadies the ends of the loop with the other, and thus fixes the edges of the wound and prevents their being separated. ("Ann. D'Ocul.," Jan.—Fev., 1871, p. 94.)

COLOUR BLINDNESS.

Dr. X. Galezowski has continued his researches as to the effects of diseases of the eye on the perception of colours, and publishes some observations in the "Annales D'Oculistique," Mai —Juin, 1871, p. 221. In his work on the diagnosis of diseases of the eye by means of the perception of colours by the retina, he has published a chromatic scale composed of eleven chromatic "gamuts" corresponding to the principal colours accepted by

M. Chevreul, and of which the latter has constructed his circles and "gamuts" of colour. The colours and their "gamuts" follow in the order of the solar spectrum. Each colour is divided into four shades taken at equal distances from the "gamuts" of M. Chevreul. This arrangement not only allows of each colour being distinguished separately, but also of the appreciation by patients of the simultaneous or successive "contrast" of colours. The author discusses the different methods adopted by different authors, such as the use of coloured papers, &c. Each method having various objections which are obviated in his plan. In his work he thinks he has published too many gradations of colour. Now he divides a sheet of black paper into an upper and a lower half, each again subdivided; in the upper subdivisions are placed the principal colours; in the lower the gradations of these colours. Red, orange, yellow, green, blue, and violet, are the colours employed, and two shades of each are given. He obtains these colours by directing solar light into a dark chamber, and reflecting it by a mirror on a prism constructed of hollow glass filled with bisulphide of carbon; the resulting spectrum is large and very bright, and having well-defined the limits of the principal colours, he selects coloured papers representing the same exactly, and then pastes them on his sheet of black paper. The secondary gradations are in accordance with "gamut" No. 5 of M. Chevreul's scale.

The result of the examination of 766 patients suffering from alterations in the fundus oculi has been to establish three varieties of chromatic defect—

A. *Morbid "Contrast of Colours."* B. *Colour Blindness.* C. *Scotomata for Colours.*

A. The name "contrast" of colours has been given to the mutual opposition between different colours when seen together, or when seen successively, by which a mixed tint (complementary colour) is produced unlike either of those looked at. This physiological phenomenon is met with, under exceptional circumstances, in healthy eyes, but analogous phenomena result from the morbid conditions brought about by the abuse of alcohol. The impression produced on the retina by one colour remains too long, so that another cannot be seen properly till a considerable interval has elapsed. After the patient has shut his eyes for a while he can tell any colour well. If such a patient be told to look at several colours at once he will see nothing but confusion, though he will be able to recognize any one separately. B. Colour blindness. 1. In optic atrophy. This is the disease in which colour blindness is most frequently met with. Of 156 patients with optic atrophy 66 were unable to detect one or many colours, or even any at all.

Green is the first colour which fails to be recognized and afterwards red. Nearly all patients suffering from progressive atrophy take the green for grey, and as the malady advances, the red becomes less and less perceptible, changing into brown, and then into black. Blue is perceived for a very long time, and yellow is detected almost as long as the patient can see light. As the yellow occupies so large a part of the solar spectrum it may also have a larger surface than the other colours in the retinal cones, so that, though they are atrophied, they still perceive the yellow. The author has only met with total colour blindness in two cases. The atrophy, consecutive to neuritis or neuritis itself, more rarely gives rise to colour blindness. Alcoholic amblyopia may produce complete colour blindness, or only for a certain colour, and the blindness varies from day to day; green is generally confounded with grey. Glaucoma gives rise to colour blindness only exceptionally. 2. Hysterical amblyopia. Cases of this affection are given, and an account of the effect on perception of colours. One fact noted is that in all the cases, besides the loss of perception of yellow and blue, all the others cease to be seen; often, even, the patients cannot tell black and white. 3. Optic neuritis, hemiopia, and different varieties of cerebral amblyopia. These are generally exempt. The loss of the faculty of distinguishing yellow indicates most frequently a syphilitic cause, and the neuritis is then accompanied by choroiditis or retinitis. 4. Albuminuric and glycosuric retinitis. Colour blindness, in these cases is very inconstant. 5. Congenital retinitis pigmentosa. This does not habitually lead to colour blindness. 6. Syphilitic choroido-retinitis. This is one of the affections which most frequently leads to colour blindness. The colour generally mistaken is yellow. Blue and green are also very frequently not recognized. The explanation of these phenomena is to be looked for in the wide-spread inflammation of the whole retina and choroid at once. Partial syphilitic inflammations of the retina, as well as certain forms of choroiditis do not produce any chromatic defect. C. Central scotomata for colours. This variety is probably due to alterations of the yellow spot, and in certain cases to atrophy of the optic disc. Apoplexies, on the yellow spot, lead to temporary or permanent loss of central perception of colour. In ten cases of idiopathic retinal hæmorrhages, the patients could not perceive any colours when they looked straight at them, but when they looked with the lateral portions of their retinæ, they could detect the principal colours without difficulty. Detachment of the retina, not materially affecting the sight, does not affect the perception of colours. In a certain number of cases the patients have complained that either before or very soon after the occurrence of detachment of the retina, they have, for days or weeks, or even longer, seen every object coloured blue or violet. The light of a candle or of the gas seemed to them to be a fine blue colour, such as azure or ultramarine blue.

SYPHILITIC AMBLYOPIA AND AMAUROSIS.

Dr. X. Galezowski has written on this subject in the "Arch. Gén. de Méd.," Jan., Fev., Mars, 1871, pp. 120–184. His conclusions are given as follow, in the "Annales d'Oculistique," Mai–Juin, 1871, p. 287. 1. Syphilitic retinitis and neuritis may exist without any choroidal changes, and most frequently the retinitis is attended with extravasation and exudation. These cases are, however, exceptional. 2. Syphilitic retinitis presents no pathognomic signs by which one can distinguish it from other kinds of retinitis. 3. If the retinitis or optic neuritis be accompanied by iritis or choroiditis with or without floating bodies in the vitreous, there can be no doubt that the affection is syphilitic. Experience has shown that no other affection, with the exception of glaucoma, can give rise simultaneously to retinal apoplexies, and to iritis or choroiditis. 4. Defective perception of colours is constant in both forms (retinitis and neuritis), but especially so in the latter. 5. The most efficacious treatment consists in the administration of iodide of potassium, and of corrosive sublimate in large doses. 6. Syphilitic choroiditis is one of the most frequent forms, and has pathognomonic symptoms. These are (1), defect or loss of sight, aggravated at times, the periods of exacerbation being often separated by wide intervals; (2) a mist in the form of a cobweb constantly before the eyes; (3) very frequent flashes of light; (4) photophobia; (5) hemeralopia at a late period; (6) continuance of central vision whilst the field is diminished at the periphery; (7) hazy optic disc; (8) retinitis pigmentosa, coming on at a late period; (9) atrophy of the central vessels of the optic disc, with preservation of the rosy tint due to the cerebral vessels, or those that supply the optic disc. 7. Retinitis pigmentosa very often is developed in the course of syphilitic choroiditis. 8. The pigmentary patches in syphilis are arranged along the retinal vessels, but they form, in addition, circular circinate masses, in the form of herpes circinata. 9. Pigmentary retinitis from acquired syphilis only differs from the congenital form, that is, the form we at present consider due to consanguineous marriages, by the circular form of the pigmentary spots. 10. Pigmentary congenital retinitis is an hereditary syphilitic affection. 11. It should be combated by treatment with mercury or with the iodide, from infancy. Beyond a certain age, the progress of the disease cannot be arrested, and it eventually leads to loss of sight. 12. Children born of syphilitic parents ought to be examined ophthalmoscopically from birth, and when retinitis is once recognized it ought to be treated as indicated above.

MYXOMA OF THE OPTIC NERVE.

Dr. A. Sichel writes at length on tumours of the orbit, and narrates a case of myxoma of the optic nerve in the "Gaz. Hebd.," Nos. 8 and 9, 1871, Mars 24 et Avril 7. The remarks on myxoma and the narrative of the case are given fully in the "Ann. d'Oculistique," Mai—Juin, 1871, p. 279. The patient was a girl, æt. 16. When she was seven years of age her left eye began to protrude. For three years the eye had been blind, and had projected considerably. Several punctures had been made into the swelling causing the exophthalmos, but only a turbid watery fluid escaped. When the patient came under observation the eye projected in such a manner that the posterior part of the eyeball corresponded with the superior margin of the orbit. A certain amount of mobility remained. The anterior chamber was markedly diminished in depth by bulging of the iris forwards. The pupil acted in sympathy with the other, but not independently. The cornea was transparent, and the eyelids still covered the whole of the prominent eyeball. Examination with the finger beneath the upper eyelid detected an elastic, semi-fluctuating tumour behind the eyeball. No pulsation could be felt. No pain was caused by the examination. The eyeball was exceedingly hard (glaucomatous). The optic disc was white and atrophied. There was no evident trace of past neuritis. The right eye was quite normal. The question of the diagnosis is considered in detail and a case reported by v. Graefe alluded to. Excision of the tumour was advised and consented to. An attempt to save the eyeball having failed, the whole contents of the orbit were removed, and the optic nerve divided as far back as possible. The patient made a good recovery. On examining the specimen afterwards, the optic nerve and its sheath, where cut across, were found to be healthy, but the substance between these had the appearance of gelatine. The tumour was the size of a large hen's egg, and consisted of two portions; one was composed of lobules of fat, representing the normal retro-ocular cushion; the other was situated in the centre, lobulated, and distinctly limited from the neighbouring parts. The colour was of a slightly rosy-grey tint, and its consistence that of a strong solution of gelatine. Pressure caused a viscid, glue-like fluid to exude. The optic nerve could be traced into the substance of the tumour, and its fibres became separated by the growth. The fluid which exuded from the tumour was turbid, and of a dirty greyish-yellow colour, viscid in consistence, so that it could be drawn out between the fingers. Microscopically, cells of various shapes were found, some of them being large and round, and each containing a large nucleus. Some were star-shaped, and others fusiform. All the cells were irregularly disseminated through the mass, and had no common orderly arrangement. The tumour itself showed an

abundant fibro-cellular network, its meshes being filled with the same cellular elements as those in the fluid, with the exception that the round cells were much more numerous. There were also numerous, very brilliant fibres, reflecting light strongly, and like those of connective-tissue. They were united together, but not in such a manner as to constitute a true network. In various parts the round cells had undergone fatty degeneration. At the part where the nerve seemed to disappear in the tumour, the nerve fibres could not be traced. In parts, they were well-defined: in others they seemed to pass insensibly into the connective-tissue fibres. Where the nerve was spread out by growth between its fibres, the elements of the tumour were seen to spring from the neuroglia. The growth was clearly a myxoma—a *myxoma hyalinum sive gelatinosum*, which in parts passed into the condition of *myxoma lipomatodes*. A detailed account of the condition of the different structures of the eyeball is given. The operation was performed in the month of July, 1867, and in the month of August, 1870, no return of the growth had occurred, and the other eye remained good.

GLAUCOMA.

Dr. A. Sichel contributes a paper on glaucoma to the "Annales d'Oculistique" (Juillet—Août, 1871, p. 19), in which he calls particular attention to the presence of a serous sac, as demonstrated by Schwalbe, within the eyeball, and which he thinks plays an important part in the production of the symptoms. He gives a very interesting summary of the literature of glaucoma, and then narrates the following experience of von Graefe. Graefe had operated on an officer affected with glaucoma, and while riding with Dr. Sichel afterwards in a cab with the windows shut, his attention was attracted by the iridescent appearance produced around a gaslight, seen through the steam on the glass, and he exclaimed that that was just what a patient suffering from glaucoma saw. When the patient had sufficiently recovered, they took him with them in a cab, and directed his attention to a gaslight seen through the misty window; the officer at once imagined that his glaucoma had returned, and not only in the eye operated on, but also in the other. It was considered that the symptom of the presence of "halos" proved clearly that there is present in the glaucomatous eye a product analogous to watery vapour, which disappears after iridectomy. Graefe does not appear to have made further use of this observation. Dr. Sichel then gives an analysis of a paper by Schwalbe in Max Schultze's "Archiv. fur Mikr. Anat.," 1870, in which the author argues that there is a serous or lymphatic sac situated between the choroid and the sclerotic. Dr. Sichel accepts this discovery

as proving how sagacious von Graefe was in classing glaucoma as a choroiditis with effusion. At first sight, however, the premonitory symptom of rapidly increasing presbyopia appeared to Dr. Sichel to militate against such an explanation, but he has convinced himself that the contradiction is only apparent. He discusses the bearing of each premonitory symptom. 1. The presence of iridescent circles. These are well accounted for by the occurrence of a serous effusion, which would play the part of the steam inside the window of the cab mentioned above. 2. Sudden and rapidly increasing presbyopia. If the choroid were separated from the sclerotic by effusion, one would imagine that myopia would be produced, as the choroid would be stretched, and the curvature of the posterior surface of the lens exaggerated. It must be remembered, however, that the premonitory symptoms generally came on at night, when the accommodation is at rest. It is when the patients wake in the morning that they find changes have occurred in their power of vision, and under such circumstances one need not be surprised to find that compression or detachment of the choroid should paralyse the accommodation. There are muscular fibres in the choroid itself, whose contractility would be interfered with by the compression; so also would that of the ciliary muscle. The ciliary nerves, too, would be directly interfered with, either by the fluid itself, or by their being compressed in the sclerotic. 3. Diminution of the field of vision is explained by compression of the ora serrata of the retina. 4. The spontaneous arterial pulsation has been already explained by von Graefe. 5. Slight and temporary alterations of vision are sufficiently accounted for by the very slight effusion of fluid. Similar effects can be produced on one's own eye by compressing the globe all round very gently with several fingers at once. Acute glaucoma, at its commencement, consists only in the periodic effusion of a variable quantity of fluid, followed by complete absorption, causing stretching of the ciliary nerves, and neuralgia of the fifth pair of nerves. To this stretching soon succeeds compression, anæsthesia of the cornea, and paralysis of the iris. Chronic, inflammatory glaucoma is explained by the sudden effusion of fluid, not followed by complete absorption, but by successive additions. Chronic simple glaucoma, is caused by slight and continuous effusion. Glaucoma *fulminans* is due to the sudden effusion of the greatest possible amount of fluid. The frequency with which glaucoma occurs consecutive to other conditions has hitherto been a mystery, but is easily explained by the present theory. Most important of all, the action of iridectomy is at once evident. It is equivalent to tapping in pleuritic effusions. Iridectomy is brilliantly successful in acute glaucoma, but in the chronic form a second operation is often required. So much so, that Coccius has recommended that a portion of iris be left included in the lips of the wound instead of performing iridectomy.

In Dr. Sichel's opinion, the sole action of iridectomy is the evacuation of the fluid effused, and it is entirely analogous to thoracentesis. Consequently, the operation is of the more value the earlier it is practised; the nearer the line of sclero-corneal incision approaches the extreme limit of the anterior chamber; the larger the portion of iris excised, and the further back the excision is carried towards the ciliary attachment of the iris. In Coccius's plan, the piece of iris in the wound may act by capillary attraction. Quaglino has published a number of cases in which simple peripheral incisions, without iridectomy had been successful.

LATERAL EXTRACTION OF CATARACT.

M. Galezowski writes ("Gaz. des Hôp." 1871, p. 142) on a new proceeding for the extraction of cataract. His plan is to make a semilunar incision in the sclero-corneal border at the external margin of the cornea, and prolong it a certain distance beneath the conjunctiva: the corneal flap thus made is terminated by a band of conjunctiva, which facilitates union by first intention. He employs a special knife, which, towards the point, is slightly curved, like a pruning knife. The advantages are considered to be that the wound is corneal, and the conjunctival margin of the flap tends to quicken union; that the wound is at the outer part of the cornea, where escape of vitreous is least likely to occur, and the speculum can be kept in during the whole operation; that it is easier to use instruments; that the incision can be made with the greatest ease with the modified knife, which is bent (on the flat) to allow of its being used in deep set eyes; and that the curve near the point allows of the finishing cut being made more easily. ("Annales d'Oculistique," Julliet—Août, 1871, p. 102.)

EXOPHTHALMOS DEPENDENT ON A VASCULAR TUMOUR OF THE ORBIT.

M. Galezowski has written at length ("Gaz. des Hôp." pp. 237, 241, 245) on exophthalmos produced by vascular tumours of the orbit. His narrative of the case which gave rise to his remarks is given fully in the "Annales d'Oculistique," Juillet-Août, 1871, p. 104. We abstract the following:—The patient was a woman aged 42, who came under care February 17, 1871, on account of prominence of the left eyeball. Three years and a half previously the patient had fallen in the street, and had received a wound at the margin of the left orbit. She suffered no inconvenience till six weeks before admission, when she awoke in the morning with headache, which lasted the whole day, accompanied by nausea. In the evening she vomited, and after-

wards heard a kind of "see-saw" noise in her head and in the eye. The next day the eye was half closed, and three days later it had become swollen, and quite closed. For the first fortnight she could not see well with the right eye, and could not distinguish the clock. When seen, the left eyeball was very prominent and motionless, the upper lid was paralysed, the lower part of the conjunctiva was much swollen, and encroached on the cheek. The pupil was not dilated, and the amount of vision was good. There was no optic neuritis. There was great pain in that side of the head day and night. A bruit could be heard over the region of the ear, the eye, and indeed over the whole head. Pressure on the carotid checked the bruit, &c. Pressure over the eye by means of a bandage was advised. At the end of a month, compression of the globe was added by means of charpie and graduated pressure. At the end of five weeks from the patient's admission there was exophthalmos, a (chiefly) diastolic bruit heard in the cranial region, and over the right carotid a continuous harsh double bruit. Recollecting the fatality of ligature of the carotid in such cases, M. Galezowski determined on trying compression. This was practised for fifteen or twenty minutes every two or three days. This was afterwards increased to forty-five or sixty minutes daily. Marked relief followed, and at the end of a month the movements of the globe had returned, the eyelid was raised, and the swelling had gone. In the month of April the treatment was interrupted for a fortnight, and then continued every two or three days till July. At the commencement of August the protrusion had almost entirely disappeared, the patient heard no bruit, and on auscultation none could be heard over the cranium. The treatment had not been discontinued when the note was published.

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Part I.

Original Contributions.

A CANCEROUS TUMOUR ORIGINATING IN AN EYE WHICH HAD BEEN LONG LOST FROM SOME INFLAMMATORY AFFECTION.

By George Lawson,

Surgeon to the Royal London Ophthalmic Hospital, and to the Middlesex Hospital.

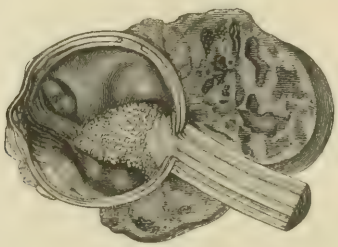
Mr. William F., æt. 69, always a healthy man and with no family history of cancer, last came under my care in January of this year for the purpose of having a long-lost, and apparently disorganised eye removed.

The sight of the left eye was first greatly impaired from a blow he received many years ago from a twig of a tree whilst out shooting, and since this accident he has been only able to see objects imperfectly. In 1860 he suffered severely from an inflammatory attack in the same eye, which appears to have caused a leucoma of the cornea, and to have completely destroyed all the remaining sight. For the first five or six years the lost eye gave him no annoyance, but after that time it became subject to recurrences of inflammation, some of which were very severe and

painful. He was repeatedly urged to have the lost eye excised, on the plea that not only would his sufferings be relieved, but the risk which he incurred of the sound eye becoming sympathetically affected would be also removed. He would not, however, consent to an operation. In October, 1870, the sound eye was destroyed by a single shot penetrating it whilst out rabbit shooting. The poor man was now quite blind, and pain was the only argument which would be likely to make him part with the eye which was undergoing disorganising changes. Since the last accident I have from time to time seen the patient, and have also frequently urged upon him the necessity of having the painful eye removed, as it was still liable to recurrences of inflammation, whilst the eye that was shot gave him no pain.

For four or five months before he came to me in January of this year, the eye had begun to bulge, and the pain which was at one time occasional was now almost constant, and at night the exacerbations were often very severe. Under these circumstances, he wished to have the globe removed.

On examining the eye, it protruded about ½ an inch beyond the other, and was quite fixed, it being unable to follow the movements of the other eye in any direction. I accordingly removed the globe in the usual manner, and in the course of the operation I came upon a tumour which filled a great portion of the orbit, the appearance and size of which is exactly represented in the wood-cut:—



Mr. Nettleship, the curator of the Museum at the Royal London Ophthalmic Hospital, has kindly examined the eye and tumour for me, and given me the following report:—

"The eye was received on January 19, 1872. It was slightly shrunken, but of good shape. The cornea was puckered and irregular, and too small; near to one part of its margin was a prominent granulation-like mass as large as half a pea. Attached to the back of the globe was a tumour about as large as a walnut, which had been unavoidably divided into two parts during the operation. Its widest part was its base, by which it was attached to the sclerotic and which almost completely surrounded the optic nerve. Its free surface was irregularly lobulated and quite distinct from the orbital tissues around it. Less than half of the tumour remained attached to the globe, but the various pieces could readily be put together. The eye, together with that part of the growth which remained attached to it, was divided in the antero-posterior direction, the section passing through the middle of the optic nerve and cornea. The *vitreous* chamber was full of bloody fluid, of reddish brown colour. There was no trace of *lens* or its capsule. The *sclerotic* was, so far as naked eye appearances were concerned, fairly normal, but all the other parts of the eye were so changed as to be scarcely recognizable. The most striking object was a *tumour* which was attached to the optic nerve-entrance and the parts immediately around it, and projected straight forwards into the vitreous chamber. It measured just ·5 inch (about 13 mm.) from the centre of its base to its apex; it was about as large as a raspberry, and of somewhat similar shape, its surface being superficially lobulated. Its base was rather more than about 7 mm. (·25 inch) wide, and was attached to the optic disc and surrounding retina. Its apex was continuous, with a soft mass of blood-stained membrane, which was attached in front to the parts in the ciliary region, and was probably derived from the

vitreous. The cut surface of the tumour varied in appearance in different parts. Near the optic nerve it was tolerably firm, uniform, and of a light grayish colour, with slighter mottlings of pink and pale yellow. This firm part passed in front somewhat abruptly into a much softer and less uniform structure, which made up by far the greater part of the tumour. The softer portion looked porous, almost spongy, and presented a great many blood points, apparently the orifices of cut vessels. The *retina* and *choroid* could not at first be separately made out, being in most parts more or less completely fused together into a thick firm fleshy layer of the same appearance as the firmer part of the optic nerve tumour. On careful trial, the retina was found to be quite separate from the choroid for a short distance around the optic disc; in front of the equator the two membranes were separable, although somewhat adherent, but between the equator and the back of the eye only one layer of tissue could be made out distinctly. From the equator forwards the retina was enormously thickened, and especially so at one side of the globe, where, near the position of the ora serrata, it formed a layer nearly ·125 inch (3·15 mm.) thick. This extreme thickening of the retina corresponded in position with the nodule of fleshy growth on the cornea. The thickening of the choroid was somewhat more uniform than that of the retina, but was nowhere so extreme; its average thickness was perhaps about ·04 inch (1 mm.). The pigment of the choroid was entirely wanting, except in the front of the eye where a thin irregular black line between retina and choroid marked the position of the pigmented epithelial layer. The iris and ciliary body could not be definitely made out. The choroid adhered everywhere most intimately to the sclerotic, so that the two tunics could not be separated without actual cutting. Both choroid and retina had the same pale grayish-pink colour as the optic-nerve tumour. The *extra-ocular growth*, which has been already described in part, had

on its cut surface numerous dark gray mottlings, but its general colour was grayish pink with yellowish patches interspersed; the most highly pigmented parts were at some distance from the sclerotic. The optic nerve (which was cut long) and its outer sheath were fused into a single solid firm mass, the two structures being distinguishable only by the slightly darker colour of the sheath. The surface of both the tumours and of the thickened choroid and retina became slightly concave on section. No juice could be squeezed (except by very firm pressure) from the extra-ocular tumour.

"One-half of the eye was hardened for about three weeks in Muller's solution; it was then frozen,* and thin sections were made of all the tissues *in situ* from optic nerve, &c., to cornea. Small separate portions of the various diseased structures were examined by teazing, and the complete sections afterwards examined, in order to make out the relations of the various parts to each other. In all parts the tissue which gave to the various structures the peculiar naked-eye characters already described consisted entirely of cells, the vast majority of which were spindle-shaped. As a rule the spindle-cells were rather short and thick and a good many of them would be better described as oat-shaped, while in some parts many were multipolar with short processes, and others had irregular forms. The multipolar and other less usual forms were most frequent in the thickened retina in front of the equator, and in the optic-nerve tumour. Each cell had a large nucleus. In many parts collections of reddish-brown pigment granules were found which, from their colour, irregular size, and usual proximity to blood-vessels, were no doubt the remains of small hæmorrhages; some of the pigmented patches in the extra-ocular tumour consisted of the same granules, but others were made up of pigmented, more or less spindle-shaped cells. The soft porous or spongy-

* In Mr. Stirling's section cutter, as adapted for freezing by Dr. Rutherford, and modified by Mr. McCarthy.

looking portion of the tumour, springing from the optic disc, differed from the denser part only in containing a vastly greater supply of large thin-walled blood-vessels, the tissue between them consisting entirely of spindle-cells. The mass of fleshy substance on the cornea consisted also of similar cells. I was not able satisfactorily to make out the presence of the sarcoma cells in the sclerotic, excepting in its innermost layers, although in many parts its bundles were separated by masses of apparently cellular structure, and looking like the aggregations of sarcoma cells seen in the other parts of the eye; teazing, however, gave negative results. When examined with low powers, the sarcoma cells were found to be packed in dense masses between the meshes of the connective tissue of the structure in which they occurred. These masses were largest in the extra-ocular tumour, but they varied much in size and shape in this tumour, as well as in the choroid and retina. The sarcoma masses refracted light more highly than the other structures, so that with high powers they sometimes had almost the appearance of masses of granular fat; they could always, however, be separated into cells by teazing. The substance of the optic nerve was entirely replaced by the same malignant growth, which here occupied the position of the nerve-fibres, and proved to be composed of cells similar in general characters to those already described. The inner sheath of the nerve was also abundantly infiltrated with the same morbid growth; the outer sheath, however, in all the sections examined, was found quite free from the deposit. The two sheaths were considerably thickened by hypertrophy of their normal structure, and were somewhat firmly adherent, instead of being united only by lax fibrous tissue; there was, nevertheless, a tolerably distinct line of demarcation between the inner sheath, whose connective-tissue bundles were separated by masses of sarcoma cells, and the outer sheath, which was free from them. Near to the eye the outer sheath was more or less enveloped in the extra-ocular tumour,

but even then it was not infiltrated with the malignant growth.

"In various parts of the retina and choroid there were ample evidences of chronic inflammatory changes, which had occurred previous to, or at the same time as, the production of the spindle-celled malignant growth. The inflammatory process had given rise to the formation of well-developed connective tissue, and to the production of numerous small round lymph-like cells, which differed both in size, shape, and arrangement from those of the sarcoma tissue.

"It was impossible even to guess at the precise part of the eye in which the malignant growth originally began. It is however probable, from the structure of the growth, and from comparison with other intra-ocular sarcomata, that it took origin from the choroid, afterwards spread thence into the retina and optic nerve, and passed either through the nerve or the sclerotic into the lax cellular tissue outside the globe. If this was the case, however, it is very curious that nothing like a circumscribed tumour was formed in connexion with the choroid. From the fact that the eye had been long lost, and that a certain amount of inflammatory hypertrophy was found in the choroid and retina, it is perhaps not improbable that the peculiarly diffused arrangement of the sarcomatous deposit in the choroid was in some way dependent upon changes which occurred before the commencement of malignant action."

Remarks.—This case presents several points of great interest.

1. It shows that one of the evils which may arise from a lost eye which is undergoing degenerative changes, is that it may become the seat of malignant deposit. It is true that instances of cancerous growths, originating in old lost eyes, are comparatively rare, yet they occur with sufficient frequency to show that the structural metamorphosis which usually, after a time, takes place in eyes

which have been destroyed by accident or disease, is favourable for the production of cancer. A question naturally suggests itself, whether it is possible that the accidental loss of an eye may lead to such a series of inflammatory and degenerative changes as to render that eye liable to the development of cancer within it? In answer to this, I would say that I believe that accidental causes often determine the locality and the first outbreak of cancer; and, further, that if the cancerous affection had not been thus originated, many a patient might have passed through life without having given any evidence of a constitutional predisposition to the disease. In support of this statement, I would refer to the undoubted history so often given by patients, of the first outburst of cancer in different localities of the body. Cancer of the lip frequently originates from an accidental scratch. Cancer of the scrotum from the irritation of soot, and cancer of the tongue will often commence at the point which has been fretted by a rugged tooth. In females the repeated history of a blow on the breast as being the first exciting cause of scirrhus, cannot be ignored. A very remarkable instance of how an accident may produce a wound which will assume a cancerous nature, occurred in a patient under the care of my colleague, Mr. Hulke, in the Middlesex Hospital. An apparently healthy man was smoking his pipe, when his little girl, whom he was nursing, jerked her arm against the pipe stem and caused the end of it to penetrate the soft palate. The wound did not heal, but very shortly became the seat of epithelioma, which spread over the roof of the mouth, and down the pharynx, and ultimately destroyed his life. With these facts before us, it is impossible not to recognize the relationship between cause and effect. Possibly in all such cases there may have been a tendency to cancer in the individual; but I do not think it can be for a moment doubted, that accidental circumstances may give rise to an outbreak of a cancerous

disease which might not otherwise have manifested itself.

In the case which I have related, the cancer originated in an eye which had been long lost. The patient had no history of cancer in his family; he had been always a remarkably healthy man, and my impression is, that if he had had his disorganized globe removed, he might have passed through life without cancer having been ever developed.

As bearing upon the above remarks, I would here briefly allude to a patient who was under the care of my colleague, Mr. Streatfeild, in the Royal London Ophthalmic Hospital, in January of this year. An old man lost the sight of one eye from an inflammatory attack thirteen years ago. The eye remained shrunken and quiet till within the last three or four months, when it rapidly enlarged. Mr. Streatfeild removed the eye, and after excision the globe was found full of a sarcomatous growth which had passed outwards, rupturing the sclerotic, and had formed a large extra-ocular tumour. This specimen will be described fully by the curator of the Museum, in the next number of "The Ophthalmic Hospital Reports."

2. The next points of interest are the peculiar development of the tumour, and the manner in which it had extended itself into the orbit, where it had formed a growth of the size correctly shown in the wood-cut. From the very able report of Mr. Nettleship, the tumour appears to have commenced in the choroid, and afterwards to have extended to the retina. The conical-shaped tumour which sprung from the optic nerve was probably a secondary formation; and my impression is that the disease extended along the optic nerve, through the walls of which the cancer-cells travelled into the orbit. I am strengthened in this opinion from a case of glioma of the retina, which has been lately under my care. In this patient the globe was distended with the tumour; the

sclerotic and cornea were entire throughout, and yet the whole cavity of the orbit was filled with a soft tumour of the same nature as that which occupied the eye. The optic nerve in this specimen presented exactly the same appearance as the nerve did in the case which I have just related.

As gliomatous tumours generally extend by the optic nerve, and their secondary formations are usually in connection with the optic tracts within the cranium, I think we may reasonably infer that the extra-ocular tumours in both these cases were due to the escape of cells through the sheath of the optic nerve into the orbit, rather than that they traversed the sclerotic, which in both instances were apparently entire.

A REPORT ON THE FORMS OF EYE-DISEASE WHICH OCCUR IN CONNEXION WITH RHEUMATISM AND GOUT.

By Jonathan Hutchinson.

Rheumatic Iritis is a disease which in this age of specialisms is very apt to be pushed to the wall. It is nobody's child. Dr. A, writing on Rheumatism, does not mention the eye, and Mr. B, writing on the Eye, dismisses rheumatism with contemptuous brevity. Yet an attack of this form of disease is not pleasant to bear, and many a patient would thank his surgeon if he had any efficient plan for its relief, and still more if he could say anything as to its prevention.

Our ophthalmic investigators during the last twenty years have by no means been idle. Their attention has, however, been absorbed by the cultivation of new fields. The splendid revelations of the ophthalmoscope, the enticing problems as to accommodation and refraction, and the pursuit of pathological histology, have presented attractions which have led to a very natural, but yet undesirable, neglect of topics less novel and perhaps more vague. The result of this has been that, so far from the knowledge of the modern ophthalmic surgeon being better developed than that of his predecessors, in reference to the subject of my Report, it is in fact decidedly less so. Another circumstance has also contributed to throw arthritic iritis, &c., into the shade. I allude to the greatly increased willingness shown by modern pathologists to acknowledge syphilis as the remote cause of all kinds of morbid phenomena. To such an extent has this gone, that some intelligent observers are accustomed to receive the diagnosis of "arthritic iritis" with the utmost distrust, secretly believing that, if the truth could be got at, the iritis would be found, as usual, to be of syphilitic origin.

For myself, I by no means share the suspicions to which I have just alluded. I believe most confidently that iritis due to the arthritic diathesis is a common malady, and that very many cases treated as syphilitic are really arthritic. I believe, further, that it presents several varieties of form, attended by clinical differences, quite sufficient to permit of their being told out into separate groups with convenience to the surgeon. In the following pages I propose to enter in some detail upon the clinical investigation of the maladies in question, and shall make no apology for the liberal citation of cases, since it is most desirable in such an inquiry to keep close to facts, and to secure plenty of them for safe generalisation. Before, however, proceeding to narrate my own cases, the reader will, I think, derive benefit from a glance at the opinions of authors, and I have accordingly, with the assistance of my friend Mr. Nettleship, made the following extracts from some of our standard works. In some instances a few words of criticism are appended.

Part I. Opinions, &c., of Authors.

Bader—"The Human Eye: its Natural and Morbid Changes," 1868.

At p. 95. *Catarrho-rheumatic Ophthalmia* is mentioned in connection with catarrhal ophthalmia, from which it differs by the greater vascularity of the sclerotic; no other peculiarities of the disease are stated.

On Iritis connected with Rheumatism, p. 359.—"An embolic or metastatic iritis has also been described as occurring during or soon after an attack of measles, scarlatina, variola, typhoid or rheumatic fevers."

Rheumatic Sclerotitis, p. 199.—"In rare cases we meet with an acute diffused purple redness, and slight swelling of the sclerotic, with extreme intolerance of light and great pain, brought on by exposure to cold."

STELLWAG VON CARION—"Treatise on Diseases of the Eye."

The index to Stellwag von Carion does not mention the subject of rheumatism, nor does it occur under the heads of *Iritis* or *Sclerotitis*.

MACNAMARA—"Manual of the Diseases of the Eye," 1868.

At p. 134, under "*Hyperæmia of the Sclerotic*" mentions "the arthritic ring," a term applied by him to the zone of congested vessels in the sclerotic close to the corneal edge, and by others to the narrow white ring between that zone and the cornea. He considers that the latter appearance is not characteristic of any particular kind of inflammation, rheumatic or otherwise.

Catarrho-rheumatic conjunctivitis, p. 147.—"The author cannot concede a place to a form of conjunctivitis which is described by most English surgeons as the 'catarrho-rheumatic,' because, in almost all such cases, the deeper structures of the eye are involved." From the above remarks, which occur in the chapter on "Diseases of the Conjunctiva," it is not quite clear how much importance the author attaches to the "rheumatic" element in cases of the above kind, whether he considers the disease to be mis*named* "rheumatic," or only mis*placed* as a conjunctival malady.

On Recurrence of Iritis, p. 283.—"Attacks of serous iritis are apt to recur; at first they are but slight, and of comparatively short duration," &c.

Rheumatism and Gout as causes of Iritis, pp. 290, 291.—"Plastic iritis was formerly supposed, in the majority of instances, to occur among rheumatic patients; but the truth is, we frequently meet with this disease in cases where no suspicion of rheumatism exists." "The main point, however, to bear in mind is, that no form of iritis is characteristic of any particular constitutional dyscrasia; consequently it is an error to describe one form of iritis as rheumatic, another as syphilitic, and so on; these,

and numerous other influences, such as malaria, gout, and the like, are equally frequent causes of iritis."

Rheumatism and Gout connected with Sclerotitis, p. 136.—"When inflammation of the sclerotic does occur it generally depends upon a rheumatic or gouty diathesis," but it is, in his opinion, a very rare disease.

Irido-Choroiditis and Rheumatism, p. 307.—"Syphilis, malarious dyscrasia, and rheumatism are some of the constitutional affections to which this disease may be traced."

SOELBERG WELLS—"A Treatise on the Diseases of the Eye," 1870.

Rheumatic Iritis, p. 159.—"It may also accompany rheumatism in other parts of the body, being evidently produced by the same cause;" but rheumatic iritis "has, in truth, no characteristic symptoms;" "relapses may take place on a recurrence of the rheumatic attack." "The disease often runs a chronic and very protracted course." "A very frequent cause of iritis is exposure to sudden changes of temperature, cold draughts of air, rain, wind, &c. The disease is in such cases often termed rheumatic iritis."

Episcleritis (p. 220) "is perhaps more often met with in persons of a rheumatic or gouty tendency than in others."

Gonorrhœal Iritis.—Mr. Wells has observed Iritis, in connection with gonorrhœa, in cases where the gonorrhœa was associated with rheumatism.

TYRRELL—"A Practical Work on the Diseases of the Eye," vol. i, 1840.

On Rheumatism as a Cause of Iritis, p. 338.—"Pure iritis as a result of rheumatic or arthritic diathesis I believe to be a very rare disease; but as a secondary affection in connection with such peculiar condition of system, iritis is frequent."

Mr. Tyrrell here does not show his usual lucidity.

On "Catarrho-rheumatic Ophthalmia" (Conjunctivo-Sclerotitis), p. 377, &c.—Causes, p. 380.—"The predisposing cause is the rheumatic diathesis, for very rarely does the disease appear unless the patient have previously experienced, or evince at the time, rheumatic affection of some other part or parts." "The affection is most common during the spring and autumn, when catarrhal and rheumatic affections prevail; and I can recollect two occasions in which the disease appeared to be epidemic."

Connected with *Gonorrhœa.*—"Some of the most obstinate forms of this disease which I have witnessed have been connected with the constitutional taint, which has originated in gonorrhœa."

On Colchicum in Conjunctivo-Sclerotitis, p. 386.—"I have, however, occasionally known it afford relief most rapidly; but I often use it without its producing the slightest benefit as regards the local affection."

He gives five cases of conjunctivo-sclerotitis in connection with articular rheumatic affection and gonorrhœa or urethral discharge. Some of them relapsed two or three times and in one the urethral discharge was apparently spontaneous.

On Sclero-Iritis (Rheumatic Iritis) and Rheumatism, p. 404.—". . . generally the rheumatic diathesis is well marked in those subject to this disease, the ocular affection being preceded or accompanied by other local evidences of rheumatism," &c.

On Colchicum, p. 410.—"I have occasionally employed colchicum in the early stage of the disease, with good effect," &c.

In vol. ii, p. 389, he speaks of rheumatism and gout as causes which predispose to inflammation of the eye after extraction of cataract.

MORGAN—"On Diseases on the Eye," 2nd edition, by France, 1848.

Arthritic or Rheumatic Iritis, p. 140, &c.—Most severe

in absence of other signs of rheumatism or gout: sometimes, however, occurs during a general attack.

It differs from other forms of iritis in the following particulars; the *seat* of pain, which begins in the orbit (not in the globe); the colour of the sclerotic zone is "dull rusty red" (not "bright pink" nor "cinnamon-brown"); the sclerotic injection does not reach to the margin of the cornea, hence there is a white ring of sclerotic immediately external to the margin of the cornea; not much effusion of lymph, and what there is chiefly on posterior surface of iris; sometimes permanent contraction of pupil results without synechiæ, from interstitial deposit.

After repeated attacks, opacity of capsule (not from new lymph deposit upon it) and of lens, are not uncommon. It does not tend to involve any deeper structures of eye than the iris. "Universal dulness and discolouration of iris."

Treatment. Local depletion and counter-irritation. Colchicum. Small doses of mercury (*not to salivate*). Low diet; avoidance of alcohol.

P. 143. Regards rheumatic or arthritic iritis as a "distinct kind" of iritis, which "is always produced by a transfer of that morbid action which we recognise under the terms of gout or rheumatism to the part." He considers that it is generally metastatic, being most severe "during the absence of the disorder in other parts;" indeed "very frequently an attack of gout or rheumatism in the extremities will immediately suspend the inflammatory action which was existing in the iris."

On Sclerotitis and Rheumatism, p. 148.—"Sclerotitis is in fact most frequently met with in individuals who are the subjects of mercurial rheumatism, and have previously been contaminated by a venereal poison." He states also that the iris soon gets inflamed, and implies that the cornea is frequently implicated.

Mercury is his chief point in treatment, not to ptyalism however. Blood-letting too at commencement.

He calls the disease also "Pseudo-syphilitic sclerotitis."

POWER—"Illustrations of some of the Diseases of the Eye," 1867.

Catarrho-Rheumatic Conjunctivitis, p. 173.—In an article headed "Catarrho-Rheumatic Conjunctivitis," I find no reference to rheumatism at all. When "ordinary catarrhal ophthalmia" is neglected, &c., and especially if patient is advanced in years, the inflammation "is apt to extend to the underlying sclerotic." There may be *ulceration of cornea*. Iritis, and inflammation of choroid and retina, may supervene in severe cases.

On Episcleritis and Rheumatism, p. 257.—"Regarding it as a rheumatic affection," the treatment is iodide of potassium, aconite, and colchicum. "The progress of the affection is almost always chronic, especially if left to itself."

Rheumatic Sclerotitis, p. 257.—Rare in young people, but "is, perhaps, the most common affection from which old people suffer." "Almost always referred to atmospheric changes, or to some other cause which may occasion a suppression of the functions of the skin." Has been induced in dogs by injection of lactic acid.

"The cornea is sometimes surrounded by a whitish ring." *The pain* is peculiar. At first smarting, then dull aching of brow, temple, nose, superior maxillary nerve. It is worst at night or early in morning. *Vascularity* of sclerotic and conjunctiva. Chemosis absent, or very slight. Generally both eyes are attacked. The inflammation often extends, "in a person strongly predisposed to rheumatic affections, or when the cause is both potent and persistent" to the cornea, iris, and choroid. There is early amblyopia, perhaps from disturbance of retina owing to increased tension from congestion of choroid and iris. Communication between anterior and posterior chambers often closed. The disease often leads

to "those recurring attacks of iritis" which frequently culminate in *glaucoma*.

Treatment. Leeches, opium, quinine, and iron. Aconite and colchicum. Turpentine, calomel and opium, sometimes to salivation.

Rheumatic Ulcer of the Cornea, p. 307.—"After the usual symptoms of rheumatic ophthalmia have endured for a few days," a marginal ulcer forms, deep, of elongated form, having irregularly but sharply defined edges, clear base, hazy margin, and accompanied by severe aching over the brow worse at night. Frequently followed by onyx, hypopyon, or staphyloma corneæ.

This kind of ulcer usually occurs in the "aged and debilitated," and is induced by cold. The "whitish secretion" on the lids is said to be made of "epithelial scales, and *perhaps urate of soda*."

Treatment. Colchicum and aconite, turpentine. Moist heat locally, atropine, opium if pain requires it. Local applications not of much service on the whole.

Rheumatic Iritis, p. 367. — Partly described under *Catarrho-Rheumatic Ophthalmia*. *Exudation* scanty. Disease often remains stationary for some time. Posterior synechiæ after a time. *Pain* considerable, chiefly of brow or nose; worst at night. *Vision* obscured, from turbidity of humours.

WORDSWORTH—"Ophth. Reports," vol. iii, p. 301.

Mr. Wordsworth relates three cases of iritis in association with gonorrhœal rheumatism.

LAWRENCE—"A Treatise on the Venereal Diseases of the Eye," 1830.

Mr. Lawrence describes two types of disease which he regards as rheumatic affections of the eye excited by gonorrhœa. The first is a muco-purulent conjunctivitis, and receives the name of "Mild Gonorrhœal Inflammation

of the Conjunctiva;" the second is the more severe sclerotitis and iritis, and is considered by Mr. Lawrence to be "exactly the same as rheumatic inflammation of the sclerotica and iris occurring independently of gonorrhœa."

True gonorrhœa is not essential to the production of either form of rheumatic inflammation of the eye, although it is probably the most frequent cause. The ocular disease may be preceded by spontaneous urethritis. Rheumatic inflammation of joints and lumbago occur in the same patients who suffer from the gonorrhœo-rheumatic affections of the eye; the urethra, joints, and eye may be affected simultaneously or in succession.

Mr. Lawrence does not actually state that the disease is unsymmetrical, but he seems to imply it. The iritis is usually not very severe, being followed by restoration of vision; it may, however, cause extensive posterior synechiæ.

Details are given of eleven cases of gonorrhœo-rheumatic inflammation of the eye; some other manifestation of rheumatism was present in nine of these. The cases are of great value, and I therefore subjoin a brief abstract of the most important portions of each. The headings in all cases are quoted *verbatim*.

Case XV.—*Gonorrhœa—Rheumatic swelling of the Joints—Acute external Inflammation of the Eyes, with extensive ulceration of the Cornea.*

A man, æt. 38, had never before had rheumatism. His gonorrhœa did not (he said) come on till six weeks after connexion. Both eyes were simultaneously attacked a month after gonorrhœa began. A few days after the eyes became affected, both wrists and hands and one knee inflamed. The eye disease seems to have been extensive ulceration of corneæ, with some catarrhal conjunctivitis. Vision was much impaired by corneal opacity and the pupil of one eye was immovable.

Case XVI.—*Discharge from the Urethra with purulent Ophthalmia of both Eyes, and severe rheumatic affections, followed by repeated attacks of Rheumatic Iritis.*

A gentleman, æt. 52, suffered from slight urethritis, probably not gonorrhœal. He then had conjunctivitis, severe, with copious yellow discharge in one eye, slightly in the other. The eyes got better under venesection, &c., but soon after a foot, a knee, and both hands inflamed. The joints were temporarily relieved, but the bad symptoms returned in an aggravated degree soon after, and remained, more or less, for two years. Between the attacks in the joints the eyes again inflamed, and during the next four years six other attacks occurred, ending in nearly total exclusion of each pupil. Considerable stiffness of several joints (and even anchylosis of some) remained several years after the rheumatism. He had no return of urethritis.

Case XVI.*—*Gonorrhœa, with mild Inflammation of the Conjunctiva.*

In this case a young gentleman during his second gonorrhœa was attacked by symmetrical mucous conjunctivitis; the palpebral conjunctiva was chiefly affected. He had never had any arthritic disease.

Case XVII.—*Gonorrhœa—Affection of the Hip, and mild Inflammation of the Conjunctiva.*

A gentleman, æt. 33, who had never had rheumatism, contracted gonorrhœa in the beginning of July. A fortnight later, he suffered from symmetrical conjunctivitis, affecting primarily the palpebral conjunctiva. A few days later pain in one hip and thigh came on, and gave him much trouble for several days. He was cured of all symptoms in a short time, but had a relapse of conjunctivitis and hip pain in August, after exposure to sun and dust.

Case XVIII.—*Gonorrhœa, with affection of the Joints, and mild Inflammation of the Conjunctiva.*

Mr. C. had severe obstinate rheumatism at æt. 32. At æt. 38 he caught gonorrhœa. It was followed by inflammation and

swelling of one knee and both hands, and later on by a short attack of mild symmetrical conjunctivitis.

CASE XIX.—*Mild Gonorrhœal Ophthalmia, with affection of the Joints; subsequently, acute Inflammation of the Sclerotic and Iris.*

Mr. C., married at æt. 23. In the first three years afterwards he had three attacks of mild urethritis, and a fourth more severe in the fourth year. They were not due to contagion. The last attack was attended by swelling and great pain of the left foot. About seven years after marriage he had a severe inflammation of the left eye. It appears to have been an acute keratoiritis. There was great impairment of vision, due, no doubt, to the fact that "the anterior chamber was filled with a light yellow semi-transparent substance, like jelly, completely hiding the iris and pupil." Vision was completely restored after cupping, leeching, and the free use of mercury. Two months later he caught gonorrhœa, which was presently attended by symmetrical mucous conjunctivitis, and by rheumatism in various joints, one arm, and in the back. The rheumatism hung about him for many months, and, before it was well, he had severe sclero-iritis, first of one eye and then of the other. These attacks were very obstinate, and were treated by the free use of mercury. One finger remained somewhat stiff a year later.

CASE XX.—*Gonorrhœa—Inflammation of the Joints, and Inflammation of the external Tunics and Iris of both Eyes.*

A gentleman caught gonorrhœa at the age of 28. As it was getting better, the right foot, ankle, and knee became inflamed, and shortly afterwards he suffered from symmetrical sclero-iritis, with haze of corneæ. Considerable posterior synechiæ were formed, but good vision was restored. Four years later he had another attack of iritis in the right eye.

CASE XXI.—*Acute Inflammation of the external Tunics, with Gonorrhœa—second Gonorrhœa attended by Rheumatism and Sclero-iritis.*

In this case the patient was a medical man, and was able, therefore, to follow the course of his symptoms with great accuracy. At the age of 24 he had violent gonorrhœa, attended

by acute inflammation of both eyes, with mucous discharge. A year and a half later he again had gonorrhœa of considerable severity. It was again accompanied by ophthalmia, which, after getting quickly well, relapsed and extended to the sclerotic and iris. He then began to suffer from general articular rheumatism, and a kind of see-saw action went on for some time between the eyes and the joints; when one became better the other relapsed, and *vice versâ*. The rheumatism did not leave him for several months, and two years later he had another severe attack in various joints, not, however, accompanied by disease of the eyes.

Case XXII.—*Inflammation of the internal Tunics and Iris of both Eyes, with Inflammation of the synovial membrane of the Knee, and discharge from the Urethra.*

The patient, a gentlemen æt. 25, was attacked by symmetrical iritis while suffering from slight gonorrhœa of some standing. He soon had, in addition, synovitis of one knee. The joint affection and the urethral discharge persisted for more than a year; the eyes were well in a few weeks.

Case XXIII.—*Gonorrhœa; Rheumatism, affecting the Back and Limbs; Gonorrhœal Inflammation of the external Tunics of the Eye.*

Mr. F. had a mild attack of gonorrhœa (his second) at æt. 29. It was followed by rheumatism of the feet and one hip, and by two attacks (with five weeks' interval) of inflammation of sclerotic and cornea.

Case XXIV.—*Gonorrhœa, followed by Inflammation of the Sclerotica and Iris, and Rheumatism.*

Mr. L. had slight rheumatism, in the feet chiefly, with his second gonorrhœa at the age of 25. At the age of 29 he had gonorrhœa a third time. It was followed in a week by rheumatism in the back and in the heels. Six months later he had iritis of the left eye, followed in a few weeks by a similar attack in the right, but not till after the left had got quite well. The iritis did not result in adhesions, and good sight with movable pupils was restored. The rheumatism persisted for a year or more.

LAWRENCE—"On the Diseases of the Eye," 1844.

Rheumatic Ophthalmia, p. 332, &c.—Occurs in rheumatic or gouty subjects. The co-existence of urethral discharge does not imply gonorrhœa; the urethra may participate in the arthritic inflammation.

The disease is usually *caused* by cold. When acute it often goes on to affect *cornea*, producing haziness but not suppuration: sometimes *iris* too. *Pain* more serious around the eye than in the eye itself, worse at night. Not very much photophobia. Conjunctiva not much implicated. White rim round margin of cornea. When *chronic*, it does not affect *iris or cornea.*

Treatment. Local, not much use, except local warmth and moisture. Colchicum, calomel and opium (perhaps to salivation). Counter-irritation to nape of neck.

Catarrho-Rheumatia Ophthalmia, p. 336.—So called when *conjunctiva and sclerotic* are both inflamed. But it is generally associated with disease of *cornea*, and unconnected with rheumatism.

Rheumatic Iritis, p. 428.—Occurs in rheumatic and gouty people. Iris dull: posterior synechia. Sclerotic congestion ceases before the cornea, leaving the white ring round margin of cornea (especially towards angles of eye). A little white froth on margins of lids. Amblyopia. Circumorbital pain. Prone to frequent relapses, but sight often almost perfect between successive attacks.

Treatment. Bleeding (local and general). Counter-irritation. Colchicum. Small doses of mercury.

WARDROP—"On the Diseases of the Eye," 1844.

Gouty Ophthalmia.—"However, the pure arthritic ophthalmia may easily be distinguished from the rheumatic" by its effecting chiefly "the capsule of the aqueous humour," producing posterior synechia. The cornea remaining perfectly transparent.

TRAVERS—"Synopsis of the Diseases of the Eye," 1821.

Sclerotitis, p. 129.—"The inflammation of sclerotic sometimes accompanies, and is sometimes vicarious with, rheumatic inflammation."

And p. 295, "The subjects of it are usually reduced and irritable in a high degree, from suffering with rheumatic inflammation in the elbow, knee, or ankle-joints." He thinks abuse of mercury contributes to its production. It is complicated with cloudiness of aqueous and iritis.

"The sympathy of the sclerotic and the ligamentous capsules with the urethra in gonorrhœa, is as unquestionable as that which has been more generally observed, because more frequently occurring, between the latter and the synovial membrane."

Sclerotitis and Gonorrhœa, p. 435.—He further separates gonorrhœal *sclerotitis* from gonorrhœal *conjunctivitis*, which he considers to be produced by contagion.

COPLAND—"Medical Dictionary."

P. 867, &c.—Makes a distinction between, 1. "Common or Phlegmonoid inflammation of the proper external tunics" (Catarrho-Rheumatic Ophthalmia, Mackenzie), and 2. Rheumatic Ophthalmia, and 3. Arthritic or Gouty Ophthalmia.

In the 1st. Both conjunctiva and sclerotic are affected, but *not cornea or iris.*

2nd. The conjunctiva is only slightly involved, but the inflammation may extend to cornea and iris, though generally only in a mild degree. It occurs in "persons of a rheumatic diathesis," and is "not a common affection."

3rd. "Is oftener attended by iritis than the rheumatic variety; but iritis is frequently observed in gouty people without sclerotitis."

Arthritic Iritis, p. 874.—"Inflammation of the iris is frequent in the *gouty diathesis*, but less so in the *rheumatic*, unless as a consequence of rheumatic inflammation of the

sclerotica. In the gouty it occurs most generally in the iris from the commencement . . ;" but in the rheumatic it rarely begins in the iris. In the *gouty* form " the reddish zone in the sclerotica is of a dull or nearly livid tint, and does not advance to the edge of the cornea, but leaves a narrow white ring between." " This form of iritis often returns again and again, the eyes recovering almost completely after repeated attacks."

Treatment. Local depletion and counter-irritation. Turpentine. Colchicum. Mercury injurious, except as an occasional purgative.

Dixon—" Diseases of the Eye," 1866.

Sclerotitis and Rheumatism, p. 129.—Attacks of *acute* sclerotitis " are much modified by rheumatic complications," and again, " In the severer forms of the acute disease, however, there is sometimes decided evidence of rheumatic complication."

Rheumatic Iritis, p. 154.—The inflammation of iris often extends to the sclerotic. Attended by much pain. Not much lymph effused, but what there is is behind the iris. The cornea also is often the seat of " mottled opacity," which " frequently becomes more marked as the inflammation in the sclerotic and iris subside." Mercury is often necessary when there is danger of posterior synechia.

Lawson—" Injuries of the Eye, &c.," 1867.

Rheumatic Iritis, p. 67.—He regards it as a special variety of iritis, characterised by discoloration of aqueous humour, sparing effusion of lymph, great pain and photophobia, frequent recurrence.

Association " with rheumatism elsewhere, such as pains in the limbs or joints; or the patient has suffered previously from rheumatic fever."

Treatment. Mercury not necessary as for syphilitic iritis. Quinine and iron. Turpentine. Iodide of potassium.

BRODHURST—Art. "Gonorrhœal Rheumatism." (System of Medicine, edited by Russell Reynolds, vol. i, 1866).

Cf. Travers, p. 435.—"Gonorrhœal ophthalmia is much less frequently observed than gonorrhœal rheumatism." When it occurs, "the conjunctiva sclerotic and iris may all become affected. It is not for the most part a severe form of ophthalmia." It therefore differs from *gonorrhœal conjunctivitis*, which is produced by contagion.

WHARTON JONES—Medical Review, vol. xx, p. 277.

"What is called rheumatic ophthalmia appears to be at least nothing more than inflammatory congestion of the sclerotica, usually with more or less implication of the iris."

MEDICAL REVIEW, vol. vi, p. 376 (Review of Chomel and Bouilland on the Nature and Treatment of Rheumatism).

Note on Rheumatic Sclerotitis.—"M. Chomel restricts the application of the term *arthritic inflammation of the sclerotic* more so than is generally done. He recognises it when the sclerotic becomes the seat of pain, and the redness of the conjunctiva is consecutive, without catarrhal secretion, and when these things take place in an individual previously affected with rheumatism, with which this affection has alternated."

WARDROP—A paper on "Rheumatic Inflammation of the Eye," 1818. (Med. Chir. Transactions, vol. x, p. 1.)

It is distinguished by absence of conjunctival inflammation, cloudiness with slight abrasions of cornea.

Character of Pain. It is circumorbital and facial, rather than ocular. It is often remittent. There is not much photophobia.

Sometimes ulceration and sloughing of cornea.

Affects both sexes equally. Generally occurs in adults.

CURRY—"Case of Remitting Ophthalmia," by James Curry, M.D., F.A.S. (Med. Chir. Trans., vol. iii, p. 348).

This is an autobiographic and minute account of no less than six severe attacks of "remitting ophthalmia," with mention of many other milder seizures. The general points to be noticed are that Dr. Curry was severely attacked by intermittent fever in India in early life, and afterwards became subject to regular attacks of acute gout, but there is no mention of rheumatism. These attacks of "remitting ophthalmia" are described as *following exposure to cold;* affecting generally only *one eye at once;* coming on suddenly; accompanied by *pain*, at first as a soreness of the conjunctiva, but soon becoming intense, and affecting the front of the eyeball and the parts around the orbit; remitting, the exacerbation of pain coming on regularly at *night* (in one attack they were diurnal); *dimness of sight* from turbidity of aqueous, and, in the earlier attacks, from corneal haze and a central ulcer; *injection of vessels* (probably sclerotic, but no mention is specially made, "a stream, as it were, of red vessels running from the lower part of the eyeball to the edge of the cornea"). The attacks are noted to have lasted generally *three weeks*, whether mild or severe, and in one or two a tendency to weekly remissions was observed.

With the exception of a corneal opacity, the sight seems to have been quite recovered between the attacks. The author does not seem to think the disease was connected with his gout, though in at least two of the attacks of "ophthalmia" a gouty paroxysm had occurred a little before. There is no mention of *iritis*, but the turbid state of the aqueous probably implied it.

Opium gave greater relief than anything else. Colchicum was not tried, nor mercury.

FULLER—"Rheumatism, Rheumatic Gout, and Sciatica."

Statements as to frequency of Eye Affections in Gout and Rheumatic Gout.

In writing of rheumatic gout, Dr. Fuller states: "Inflammation of the eye is another complication of considerable importance. It occurred in 11 out of 130 cases of rheumatic gout which were admitted into the Hospital during the time I held the office of Medical Registrar, and it was suffered more or less severely in 14 out of 193 cases which have fallen under my own care at the Hospital. In private practice, too, within the last few years, several gentlemen have consulted me for the same train of symptoms."

In his second edition Dr. Fuller adds the following as a note to the above statements:—"Since the above paragraphs were published, I have seen reason to doubt whether the affection is so common as these figures would appear to indicate, and whether many, if not all, of the cases in which this complication arose may not have been cases of obscure gout, or of gonorrhœal rheumatism. This at least is certain, that since my attention has been specially directed to this question I have been enabled to trace a gouty or venereal" (gonorrhœal?) "taint in every case in which the eye has been inflamed in connection with presumed rheumatic gout." He includes in these statements not iritis alone but arthritic inflammation of conjunctiva, sclerotic, and choroid.

Thus Dr. Fuller's testimony strongly supports the belief that gout and gonorrhœal rheumatism are causes of inflammation of the eye.

BRODIE—"Diseases of Joints," 5th edition, p. 42.

On Gonorrhœo-Rheumatic Iritis, &c.—"I have already adverted to a peculiar disease of which inflammation of the synovial membranes is the principal feature, but in which that inflammation occurs in connection with purulent inflammation of the urethra and sometimes with purulent ophthalmia."

He further says that the cases are not uncommon, are well known to practical surgeons, but that no distinct account of them had been published till the first edition of his work.

"The disease is usually described under the name of gonorrhœal rheumatism, though it is plain from the course of its symptoms, and from the effects of remedies, that it differs from ordinary rheumatism in many essential circumstances; and though there seems to be no doubt that, while it occurs in most instances as a consequence of gonorrhœa, it may take place quite independently of gonorrhœal infection."

He details the case of a gentleman, aged 45, who had an attack of gonorrhœa. In about a week he had pain in his feet followed by some inflammation of the eyes." In two or three days more, the pain in the feet was more severe; the conjunctivæ were much inflamed "with a profuse discharge of pus." There was considerable fever, the synovial membranes of the ankles, tarsus, &c., were inflamed, and in a few days one knee was affected, the inflammation of the eyes and of the urethra having somewhat abated.

A month from the commencement of the illness, the other knee and the shoulder became affected.

Four months after he had fairly recovered, he had a second attack very similar to the first.

Three months later, "he became affected with an ophthalmia of a different nature from that under which he had laboured in the preceding summer. The inflammation was seated in the proper tunics of the eye, and it seemed probable that it would have terminated in adhesions of the iris and destruction of the power of vision, if the progress of it had not been arrested by repeated blood lettings and the use of mercury. He had another attack of the same kind of ophthalmia four years afterwards." During the next twenty years he had no return of the joint affection, nor of the purulent ophthalmia, "but no

year elapsed without an attack of acute iritis. Each attack left the eye with its organisation more impaired than it had been previously. At last the power of vision in one eye was completely destroyed, while that of the other was very imperfect." He died of an attack of pleurisy. Colchicum, leechings, and mercury were the the principal remedial agents employed.

" One gentleman (at the time the notes were taken), had suffered from as many as nine attacks of this complaint. The first took place when he was under twenty years of age, and the others at various intervals in the course of the next twenty years. In one of them the first symptom was inflammation of the urethra, attended with discharge of pus, although, from particular circumstances, he could not believe that he had been exposed to the risk of infection. This was followed by purulent ophthalmia, and that by inflammation of the synovial membranes. In three of the attacks a purulent ophthalmia was the first symptom, which was followed by inflammation and discharge from the urethra, and then the synovial membranes became affected; and in the other four attacks the affection of the synovial membranes took place without any preceding inflammation either of the eye or of the urethra. The disease was not confined to the synovial membranes of the joints, but those of the synovial bursæ were inflamed also. In some of the attacks the muscles of the abdomen were painful and tender, and subject to spasmodic contractions; and there was an occasional impediment to breathing, which seemed to arise from a similar affection of the diaphragm. The acute form of the disease, in this case, lasted from six weeks to three months; but nearly a year generally elapsed before the use of the limbs was perfectly restored. He had an attack in July, 1817; and in the beginning of May, 1818, while he was still lame, he was seized with a violent inflammation of the sclerotic coat and iris of one eye, which was subdued by very copious blood-letting and the exhibition of mercury. He

had another attack of the disorder in the year 1820, and in the winter of 1822 he became affected with an inflammation of the iris and sclerotic coat of the other eye, which was also relieved by blood-letting and the use of mercury. Another gentleman gave the following history. In the year 1809 he had symptoms resembling those of gonorrhœa, and when these had continued for some time, one testicle became inflamed and swollen. This was followed by purulent ophthalmia and inflammation of the synovial membranes. In 1814 he had a similar attack, with the exception of the swelled testicle; and in 1816, when I was consulted he still laboured under a chronic inflammation of the synovial membranes of the knees and ankles, the consequence of the last attack and by which his lower limbs were completely crippled. In a fourth case the patient laboured under a severe ophthalmia, which was followed by inflammation of the urethra, and then the joints became affected; but I had no opportunity of watching the progress of this case, nor have I heard any other particulars of it. In another case the patient laboured under strictures of the urethra. He had four attacks of the disease which has just been described, in the course of a few years. The inflammation of the urethra was in all of them the first symptom, being followed by purulent ophthalmia and afterwards by inflammation of the synovial membranes, and swelling of nearly all the joints. In two of these attacks, he attributed the discharge from the urethra to his having received the infection of gonorrhœa, and in the two others, to the use of the bougie."

"In the ordinary and less complicated cases of this disease, there is generally an attack of gonorrhœa, having its usual origin, which after a few weeks is followed by inflammation of the synovial membrane of one or more of the articulations. Sometimes the symptoms of gonorrhœa subside before the synovial membranes become affected; at other times the two orders of symptoms run their course together. In some instances, the disease subsides

after the lapse of a few weeks; in others, it is protracted for several months or even for one or two years. The inflammation is for the most part of that kind which terminates in an effusion of serum and not of coagulated lymph. But sometimes it is more intense, leaving the synovial membrane thickened and the joint more or less stiff; and I have known a few instances in which the cartilages became ulcerated, with great pain to the patient, at one time anchylosis being the ultimate result."

WELLER—"Manual of Diseases of the Eye" (compiled especially from Dr. Beer's works. English Translation), 1819, p. 215, &c.

Rheumatic inflammation attacks the outer tunics alone in most cases; sometimes the iris suffers also. Along with slight congestion of the eye, there is often very severe pain in and near the eye. Muddiness of cornea is spoken of as occurring at a later stage, and this is sometimes accompanied by the formation of small ulcers. Exposure of the head or eye to cold air, especially when the skin is perspiring, and similar influences, are spoken of as causing this disease.

A separate article is devoted to arthritic (*i.e.*, *gouty*), sclerotitis and iritis (p. 220, &c.). The disease generally attacks persons who are evidently gouty, but it may occur in patients who have never had gout; it may also "be formed from a rheumatic ophthalmia." The "bluish white ring" round the cornea is spoken of as pathognomonic of gouty inflammation. The pupil becomes contracted and at length occluded by "web-like" lymph. The iris becomes discoloured, and varicose vessels may be seen in it at a late stage. Generally only one eye is attacked at once, but the fellow suffers sooner or later. The eye becomes atrophic after repeated attacks of gouty inflammation. Glaucoma is regarded as another form of gouty inflammation.

Local blood-letting and counter-irritation to the spine or behind the ears, and local warmth, are the chief means of treatment. If the patient be gouty, the gout must be treated "according to rule," and the ocular disease may sometimes be relieved by inducing a gouty attack in the feet.

FRICK—"Treatise on Diseases of the Eye." Edited by Welbank (including especially the Doctrines and Practice of Beer), 1826, p. 58, &c.

A good article is devoted to *Rheumatic Ophthalmia.* The disease is primarily a sclerotitis, but the iris becomes affected in many cases later on.

At p. 70, &c., gouty or arthritic iritis is spoken of.

The account of these diseases is much the same as that given by Dr. Weller.

In a note to the article on "Gonorrhœal Ophthalmia," the Editor, Mr. Welbank, clearly separates between the sclerotitis accompanying urethral (not necessarily *gonorrhœal*) rheumatism, and the purulent gonorrhœal conjunctivitis.

VETCH—"Practical Treatise on the Diseases of the Eye," 1820.

Regards rheumatism and gout as frequent causes of iritis and sclerotitis (p. 90). Iritis with a primary inflammation of the sclerotic coat is not a very unfrequent effect of gout in irritable subjects (p. 103). Supraorbital pain is an early symptom. The pain is not constant, and is worse when the patient is warm in bed. The white ring around the cornea and the greater conjunctival congestion, are regarded as the chief symptomatic differences between syphilitic and arthritic iritis. Free and repeated local bleeding, counter-irritation to the neck and neighbouring parts, and more or less mercurialization, are the chief measures of treatment recommended. Protracted

rheumatic inflammation of the eye is often cut short by an emetic.

He also describes a rheumatic sclerotitis with or without severe conjunctivitis, occurring during gonorrhœa, and relates the case of a Major in the Army who had two attacks of sclero-iritis in association with gonorrhœa and severe articular rheumatism, producing serious damage to the joints. This patient remained liable to returns of gonorrhœal discharge.

MIDDLEMORE—"Treatise on Diseases of the Eye," 1835, p. 562.

"Rheumatic sclerotitis." He distinguishes between "simple acute inflammation" and "rheumatic inflammation" of the sclerotic. The latter is the more common; it "takes place *most commonly* independently of the present existence of any rheumatic affection, but *not* independently of the former existence of rheumatism; and in very many instances it would seem to be vicarious of rheumatic inflammation elsewhere." In rare cases it coexists with acute rheumatic affection elsewhere; in some cases the sclerotitis distinctly alternates with rheumatism in some other part. "It rarely attacks both eyes at once," but has "a strong tendency to relapse." Iritis may supervene.

Gouty iritis (p. 689) may "exist in connection with gout" elsewhere (though not commonly), "or it may alternate with gouty inflammation in some other situation," or it may occur in persons, "who are, in the ordinary acceptation of the term, members of a gouty family. He has seen the pupil occupied by "calcareous deposition, resembling that which occurs from gouty inflammation in other parts" in one or two cases. It is liable to relapse.

Both the above articles are ably written, and show evidences of much original observation and reflection.

JACOB—"A Treatise on the Inflammations of the Eyeball." 1849.

Inflammation of the Eyeball from Gonorrhœa, p. 99, &c.—After mentioning cases recorded by Sir B. Brodie and Mr. Lawrence, in which inflammation of the eyeball occurred, together with urethritis (either gonorrhœal or spontaneous) and synovitis, Dr. Jacob says, "It may, I think, with safety be admitted, that in certain gouty or rheumatic constitutions inflammation of the urethra, joints, and eyes, takes place without any true contagious gonorrhœal disease; and that, on the other hand, inflammations of the joints and eyes, which might not otherwise occur, arise from ordinary gonorrhœa." The disease is, according to the author, specially characterised by affecting chiefly the *cornea*, which becomes cloudy throughout, roughened on its anterior surface, and sometimes dotted with little opacities on its posterior elastic membrane. It often, however, extends to the iris and other parts of the eye. It is liable to relapse on exposure to wet or cold, or on recurrence of certain disturbances of general health. Dr. Jacob has not seen lymph in the anterior chamber in this disease.

There is also "a mild form of conjunctival inflammation, very different from the violent gonorrhœal ophthalmia" and from the corneo-iritis above described, which is a consequence of gonorrhœa.

Gonorrhœal inflammation of the eyeball is a rare disease.

Rheumatic Inflammation of the Eyeball, p. 114, &c.—This disease is a sclerotitis with iritis and corneitis. In mild cases "the membrane of the aqueous humour" is the part most or solely affected. There is generally more congestion, both of sclerotic and conjunctiva, than in other forms of iritis. None of the symptoms, however, are peculiar to *rheumatic* iritis; nor will any of them

"justify the practitioner in pronouncing positively that the disease is true rheumatic inflammation of the eye, unless there be unequivocal proof of the previous or present existence of rheumatic constitution or diathesis, as indicated by inflammation of the joints, with the peculiar accompanying fever, or that disturbance of the system called acute rheumatism; or unless there be at least shifting pains of joints or muscles with brief febrile paroxysms, perspirations, lithic deposits in the urine, and general ill health." He does not think that *catarrho-rheumatic ophthalmia* should be separated from rheumatic inflammation of the eye as a distinct species.

He thinks that rheumatic inflammation may begin in the retina and choroid, such cases "commencing with what are called amaurotic symptoms, before the sclerotic vascularity or changes in the iris appear." Such cases are probably instances of painless irido-cyclitis with glaucoma supervening.

On Gouty or Arthritic Inflammation of the Eyeball, p. 139, &c.—Under this heading, Dr. Jacob describes two diseases—simple glaucoma and iritis; the iritis is not distinguishable from the rheumatic iritis. These forms of inflammation often occur in patients who suffer from gout, or who inherit a gouty diathesis, but have not yet suffered from the arthritis. Gouty inflammation of the eye sometimes alternates with gout in one or more joints, and has been arrested by inducing an attack in the foot.

DESMARRES—"Traité des Maladies des Yeux," 1847, p. 163.

Does not describe "rheumatic ophthalmia," "scrofulous ophthalmia," "arthritic ophthalmia," &c., as separate diseases, but considers that the constitution of the patient may affect the course of an ocular inflammation.

GALEZOWSKI—"Traité des Maladies des Yeux." Première partie, 1870, p. 347.

A short description is given of iritis occurring with gonorrhœal rheumatism. It is generally a serous iritis with deposits on the posterior surface of the iris; but sometimes, especially in relapsed cases, much flocculent lymph is effused, so as even to fill the whole anterior chamber. The disease runs a rapid course, but is very liable to relapse if the patient gets another gonorrhœa.

Episcleritis and parenchymatous scleritis are believed to be often due to the rheumatic diathesis (p. 322 and 326). A short notice is given of gouty iritis (p. 347). The author does not think that the existence of a rheumatic iritis has been clearly proved.

MACKENZIE—"Practical Treatise on the Diseases of the Eye," 1854.

Rheumatic Ophthalmia, p. 506.—Is seated in the sclerotic and capsule of Tenon, and may extend to the iris.

Is distinguished from catarrhal ophthalmia by the *radiated* (not reticulated) arrangement of its vessels.

It is an inflammation of the *fibrous* membranes of the eye, not of the mucous. The pain is throbbing and deep-seated, and more circumorbital than ocular. It seldom attacks both eyes at once. Is generally attended by haze of cornea and *slight* iritis. It is *caused* by cold, especially a stream of cold air playing on the eye while head is perspiring. It is not metastatic with rheumatism elsewhere, and often occurs in persons who have never had rheumatism elsewhere. "Idiopathic sclerotitis" would perhaps be a better name. Perhaps the periosteum of orbit and fascia of temporal muscle are affected with rheumatism at same time; or the pain may be seated in the branches of the fifth nerve to the face, and be, to a

great extent, in sympathy with those branches which go to inside of eyeball.

"Catarrho-rheumatic ophthalmia" is treated of in a separate article, and is the name given to a mixed inflammation of conjunctiva and sclerotic, without much conjunctival discharge, often accompanied by chemosis, and frequently complicated by superficial creeping ulceration of cornea, or by interstitial suppuration, followed by hypopyon, iritis, and perforation of cornea.

Rheumatic Iritis, p. 538.—Sometimes affects both eyes at once. The pain and manner of onset (sudden) resemble the same features in sclerotitis. Very liable to relapse.

It is never metastatic with rheumatism elsewhere, but often occurs in those who have been long subject to other rheumatic affections. Sometimes caused by irritation of a decayed tooth. Often relapses frequently, or with regularity once or twice a year, sight being more and more injured after each attack.

He speaks also of an "Arthritic Corneitis," p. 530, characterised by roughness of cornea with haze from intestitial deposits, a blueish-white ring close to corneal edge, and sometimes slight iritis. It occurs in elderly people, especially those who have suffered from gout.

The article on "Arthritic Iritis" treats chiefly of glaucoma, partly also of the ordinary forms of rheumatic iritis, and partly of those which are followed by a glaucomatous state.

Gonorrhœal Iritis, p. 552.—"A profuse effusion of coagulable lymph now takes place, speedily filling the pupil, and sometimes falling down in a curd-like form, and in considerable masses into the anterior chamber. In some cases the anterior surface of the iris is covered with lymyh, as if coated with white paint. The anterior chamber is sometimes almost filled with the effused lymph. In fact, no other variety of iritis presents this symptom in the same degree."

Generally occurs in young men of scrofulous constitu-

tion, and who are much exposed to cold. Occurs after or before the gonorrhœal synovitis in the same patients. Very liable to relapse. Rarely attacks both eyes at once. Is very severe, but very amenable to treatment, the abundant lymph being rapidly absorbed.

In his article on "Gonorrhœal Ophthalmia without Inoculation or Metastatis," p. 480, he quotes Mr. Abernethy (Surgical Lectures), who "had known many people who were liable to rheumatism of the joints, to puriform discharges from the urethra, and to this irritable ophthalmia, and said that these diseases used to alternate the one with the other."

Part II. Original Cases.

Case I.—*Numerous attacks of Iritis—Chronic Rheumatism for twenty years—Hereditary history of Rheumatic Arthritis.*

John Turner, æt. 66, a publican, a large, stout, florid man, consulted Mr. Hutchinson at the Ophthalmic Hospital on December 1, 1870. When admitted, his pupils were found to be covered with thin gray films of false membrane; as to *vision*, he could see to read with difficulty with the right eye, but had very little sight with the left. He stated that he had had repeated attacks of iritis in each eye; the left had been attacked four times and the right twice within a period of eleven years; the first attack occurred in his left eye at the age of 55. He had been liable to chronic rheumatism for twenty years. His first attack of rheumatic inflammation was severe, and laid him up for nearly six months; it occurred at first chiefly in his feet, but latterly had affected especially the back and upper extremities. On examination lips of bone were found on the condyles of each femur. He had been obliged to give up his business ten years before, on account of his health. He had drunk largely during his life of brandy, sherry, and bitter beer, but not much of port wine or stout.

His father, a bailiff and shepherd, was crippled by rheumatism, and died of the disease at the age of 50. He lived well, and was moreover liable to be out in all weathers.

CASE II.—*Iritis in a Man who had had Rheumatic Fever—History of Iritis with Rheumatism and of Gout in Relatives of the Patient.*

William Joyce, æt. 20, with pale complexion, dark hair, very little hair on his face, was admitted under the care of Mr. Hutchinson, at the Royal London Ophthalmic Hospital, on December 1, 1870, suffering from iritis in the left eye. He had a severe eruption of pustular acne on his face. He was engaged in the manufacture of perfumery, and worked much in hot steamy rooms. With his left eye he could only see 18 J. (with the right 1 J.); there was much conjunctival and ciliary congestion, and there were patches of ecchymosis on the conjunctiva; the cornea was somewhat dull and pitted; the aqueous was dull, and contained some blood at the lower part; the pupil was dilated and circular from the use of atropine, which he had employed before admission, but the iris showed several patches of dull red ecchymosis near its ciliary margin. He stated that his eye had inflamed without known cause about four days previously; it felt hot, and had been very painful. It was his first attack.

A year before this he suffered a severe attack of rheumatic fever, and was laid up for three months; his joints were much swollen. His father, a shoemaker, 45 years of age, had been liable to "rheumatism" in his left knee for several years; these attacks were brought on by exposure to cold, and were accompanied by considerable swelling of the knee; he had drunk much beer in his time. His father (the patient's grandfather), also a shoemaker, aged 72, had been liable to attacks of gout for more than twenty years.

The patient's father, besides his articular rheumatism,

had suffered several attacks of iritis in each eye, and was under Mr. Streatfeild's care for an attack at the time when the patient was admitted at Moorfields.

CASE III.—*Numerous attacks of Iritis and of Chronic Rheumatic Arthritis — Chronic Eczema — Family history of Rheumatic Arthritis and Skin Disease.*

James Bond, æt. 50, a carpenter, plethoric, with dark hair and eyes, applied to Mr. Streatfeild at the Royal London Ophthalmic Hospital, on September 5, 1870, and was transferred to Mr. Hutchinson, on November 7. At the latter date there were extensive posterior synechiæ in each eye, but no actual inflammation was then present. He stated that he had had numerous attacks of iritis, the first attack having occurred nine years before; it was in his left eye, and this eye had altogether suffered much more severely than the right. The attacks were generally of short duration (sometimes only a few hours, and often not more than two or three days), and attended by much pain. When his left eye first inflamed he was suffering from his "first bout of rheumatism;" the shoulders, hips, and ankles were the parts chiefly affected. Since that time he had had occasional attacks of rheumatism, especially in the ankles and the left shoulder. Many years before he had struck his left shoulder in falling. He had for many years been liable to chronic eczema on his face, scalp, and hands; it sometimes got nearly well. He had always lived well, and formerly had drunk a good deal of beer. He did not think that the temperature of the air affected him much, but believed that his rheumatism was generally worse in damp foggy weather. His health in other respects had been good. His legs were œdematous. His urine was clear, and contained no albumen.

His father suffered at about the same age from rheumatic attacks in his joints, apparently of much the same kind as the patient's attacks. The patient's sister had been liable for some time to skin eruption at the elbows.

CASE IV.—*Iritis repeated several times—Severe general Rheumatism for many years.*

Henry Wilson, æt. 37, a lighterman, with fair complexion and grey irides, was under Mr. Streatfeild's care at the Royal London Ophthalmic Hospital in May, and again in October, 1870, on account of iritis. His first attack of iritis had occurred about nine years before; he had had about four attacks altogether; both eyes had been more or less involved, but on the whole he considered that the left had suffered more severely than the right. The iritis generally occurred in autumn.

He had been liable to rheumatism for fifteen years; his first attack was comparatively slight, lasting only about two weeks, and affecting his shoulders and knees. Several years later (*i.e.*, nine years ago, and simultaneously with his first attack of iritis) he had a very severe attack of general rheumatism; it set in suddenly with acute pain in the left wrist, and afterwards affected all the large joints in his body, except those of the right arm. He was in bed for twelve months, during the last three of which he was under Dr. Davies's care, at the London Hospital. He did not improve much under treatment; he was carried into the hospital and carried out again; he was kept upon milk diet, although he had a large appetite. After returning home he used electricity. He had been a moderate beer drinker, but had been temperate in all respects. He did not know much about his relations, but was not aware that any of them had suffered from rheumatism. He stated that he was very liable to catch cold from exposure to the river fogs in following his occupation. His colds were usually accompanied by herpes on the lips, and nasal catarrh, and the herpes was always preceded by shivering. He said that his urine was usually thick when he had a cold, but not otherwise.

He had had a single attack of gonorrhœa many years before, but this was not until after his first attack of rheumatism.

CASE V.—*Iritis in a Patient who had suffered from Rheumatic Fever, Chronic Rheumatism, and Gonorrhœa—Hereditary History of Rheumatism.*

Edward Clay, æt. 28, of dark complexion, was admitted under Mr. Hutchinson's care, at the Royal London Ophthalmic Hospital, on November 3, 1870, for his first attack of iritis. His left eye was affected, and the attack began three days before admission with much frontal pain and congestion of conjunctiva. On admission, there was general brick-red congestion of the conjunctiva, and ciliary congestion; there were several posterior synechiæ and a single small speck of lymph on the margin of the iris; almost the whole pupil was covered by a thin web of false membrane.

For many years he had been subject to rheumatic pains. Five years before admission he had a gonorrhœa, and during its course he had rheumatic fever; he was in bed for ten weeks with the rheumatic fever, and was delirious part of the time. At the time of admission his chief rheumatic ailment consisted of pain in the right knee. Many years before he had suffered much from "gravel," but he had not noticed his water to be thick latterly. He stated that his mother suffered very much from rheumatism, and that her fingers were crippled by it.

CASE VI.—*Case of Recurrent Iritis in which the attacks were very severe, and for some time occurred regularly every year—History of Acute Rheumatism in Childhood—Liability to Sciatica and Lumbago—No attacks of Iritis during last fourteen years of life.*

Mr. B., æt. 46, florid, of sanguine temperament and very active mind. At the age of 10, in consequence, as was believed, of long bathing, he suffered a very prolonged attack of acute rheumatism, during the course of which both eyes were acutely inflamed. Since that time he has had several attacks of rheumatism and five or six of ophthalmia. In January, 1855, his

ophthalmia returned, the previous attack having been seven years ago, and in spite of the treatment adopted by several medical men it persisted, with intervals of a few weeks at a time, until June. On June 2 I was consulted for the first time. I found the left eye much damaged by previous inflammation, and the seat of subacute iritis. The pupil was oval, and the iris adherent by dense bands of old standing false membrane. The right eye was sound, both as regards present and past disease, although it had formerly been acutely inflamed. There were no symptoms of bodily ill health whatever, nor any of rheumatism. I was told that during a former attack he had taken the iodide of potassium (probably in small doses), under the late Dr. Bevan's prescription, and that during an attack, many years ago, in which Dr. Hodgkin had been consulted, mercury had been pushed to salivation with much advantage. The affection had, however, been very obstinate, and had usually lasted many weeks at a time. A pill containing a grain of the acetic extract of colchicum, two of Dover's powder, and one of blue pill was ordered twice daily, and a draught in which were two grains of the iodide and five minims of the tincture of iodine three times a day. After a week's treatment the inflammation quite passed off, and the remedies were discontinued. Within a few days, however, a relapse occurred, and then, in spite of perseverance with the same treatment, the disease passed in a very acute form, and much lymph was effused. We went on with the treatment, using also free counter-irritants, and in the course of about three weeks the disease passed, and no relapse occurred until February of the following year.

Feb. 4, 1856.—When I was sent for on this occasion the iritis had persisted for ten days, and a course of the tincture of guaiacum had been given without benefit. The pain was severe, and the intolerance of light great. Ordered seven grains of the iodide three times daily, and the colchicum pill every night. The improvement was satisfactory, and in a fortnight he was able to go to business again. A relapse, however, followed a week later, and on February 25 I again had to see him. The same medicine was again ordered, and in another ten days he was quite well. During this attack I examined some serum obtained by blistering for lithic acid, but found none. The memorandum that I made at the conclusion of this

attendance was that in case of another attack ever occurring I would either give fuller doses of the iodide or a rapid mercurial course. Mr. B. himself, who had been very observant of the effects of remedies on his most troublesome affection, put great faith in the iodide in the doses last prescribed, and felt sure that he had much sooner got rid of the pain, &c., under its influence than under any other treatment.

Feb. 1, 1857.—Mr. B. again called in on account of his old enemy. The attack had now lasted three days, and he had already begun the iodide in small doses. The cornea was hazy, lymph was effused in the iris, and the sclerotic presented a marked zone of congestion. All bodily functions appeared in perfect order. Four or five blisters had been applied, and had risen freely, but without benefit. I ordered ten grains of the iodide and a scruple of acetate of potash every four hours, with a compound colchicum pill every night at bed-time.

During the evening and night of the day on which the treatment was begun the disease seemed to advance, and the pain was very severe indeed. On the next day improvement began, and on the third day he was able to go to the City to business. He had taken the medicine most punctually, and in the course of 72 hours had at 18 doses taken 3iij of the iodide and 3oz. of the acetate. No inconvenience whatever had been experienced, and free diuresis was the only effect of the medicine which had been noticed. He had never in any previous attack got well nearly so rapidly, and was delighted with the result. During the summer I was in the habit of frequently meeting him, and can state most positively that his health had in no way suffered from the treatment adopted.

In the following year Mr. B. had another attack, which was again treated with tolerable success by the iodide. Each attack had laid him up for a fortnight in the house, and their severity had been such as to make him very anxious to adopt some preventive measure. There did not seem anything in reference to habits of diet which we could alter, and as he lived in a damp neighbourhood, our attention was directed to the propriety of a change of residence. This, however, although almost determined on, was never carried out. Mr. B. has remained under my observation during the last ten years, living in the same house, pursuing precisely the same occupation. His liability to iritis

would appear, however, to have ceased, and he has had no attack since February, 1857. He has, however, had several severe attacks of lumbago and sciatica, but no articular gout or rheumatism.

Jan., 1872.—Mr. B. died of apoplexy of the cerebellum in January, 1871. He had then been fourteen years without experiencing any attack of iritis. He was 61 years of age. His knee joints presented excellent illustrations of the conditions commonly met with in rheumatic arthritis. I have preserved one of them.

Case VII.—*Acquired Gout of many years' standing—Commencing Atrophy of Optic Discs, and partial Deafness, with signs of Cerebral Disease—The patient, a large smoker, subject to Gout, and has worked in lead.*

Thomas E., æt. 62, has been subject to gout since he was 26 years old, and now has a chalk-stone in his right ear. He believes that he earned his gout by free living, for he was an asylum attendant until about eight years ago, when he was obliged to give up that occupation on account of his gout. His first attack was in the right ankle, but he has since had it in many joints

He believes that his father never had gout; he was, however, a coachman, and lived freely, and it is possible that he suffered from it to some extent without the patient (who was his youngest *son*) knowing of it. The patient has a sister younger than himself who has not had gout; neither has an elder brother, who is a painter, suffered from it. He knows of no gouty or rheumatic relatives.

He comes on account of his sight, which has been failing for about eighteen months. He has partial atrophy of each disc, the outer (yellow spot) half being abnormally pale. His pupils act fairly to light, but do not dilate well with atropine.

He has smoked for 40 years. Formerly he smoked largely (an ounce a day), but lately he has not used nearly so much tobacco. It has sometimes made him giddy, but has not otherwise disagreed. For two or three years he has been getting rather deaf, and his memory and intelligence have become impaired. He says he gets "muddled," and he certainly takes a long time to understand and give answer to a question.

After leaving his asylum work he took to painting, but for

about 18 months past has done nothing. He is well acquainted with the symptoms of lead poisoning, and says that he has never had any of them. It is, however, necessary to bear in mind the fact of his having worked in lead when we have to consider the cause of his optic atrophy.

We have three possible causes of this man's eye symptoms. Tobacco may be fairly considered as the most likely of all, seeing that he has been a heavy smoker for many years; and this is not made less probable by the signs of cerebral disease presented in his diminished memory and slowness of intelligence, and partial deafness. Chronic lead poisoning would probably explain the results almost as well as tobacco, if its presence were proved; we must note, however, that the condition of the discs is not that which usually follows the neuritis of lead poisoning, the atrophy being chiefly at the outer half of each disc, and the vessels not being at all markedly diminished. His cerebral symptoms may be equally well accounted for by supposing that he had some senile degeneration of his brain in connection with diseased arteries, or perhaps dependent upon the condition of his kidneys; and perhaps the atrophy of his discs and his partial deafness may depend upon the same cause.

Case VIII.—*Persistent aching of one Eye (the right) associated with Neuralgia on the same side of the face and head in a Woman who inherits from her mother the arthritic diathesis, and has transmitted it to her youngest daughter—The patient Myopic—Her eldest daughter suffering from a peculiar form of cataract, worse in the right eye.*

Sarah Ellis, æt. 48, is highly myopic, more so in the right eye. She reads [illegible] with each eye, needing — 3 for the right and — $3\frac{1}{2}$ for the left to see $\frac{20}{50}$ and $\frac{20}{40}$ respectively. Her complaint is of constant aching in the right eye, which has, she says, been present about eight months. This pain is made somewhat worse by use of the eye for small objects, and is diminished by resting the eyes, but it is scarcely ever quite absent. She says the pain "is as if the eye was too large for the socket." The pain often extends from the eye to the right side of the forehead, back of the head, right side of the nose, and sometimes a little way down the

right side of the neck. She never has it on the left side. There is slight ciliary congestion in both eyes. There are no crescents, and no glaucomatous cupping is seen.

She is subject to slight chronic rheumatism in her knees and elsewhere, but has never had any severe arthritic attack. There are small lips on her femoral condyles.

Her mother, now 85, is said to suffer from "rheumatism" in her thumb and legs, and her knees have for a long time been weak. Her mother's brother died of gout after suffering from it for 20 years. Her youngest daughter has had "rheumatic fever," with swollen joints. Her eldest daughter, æt. about 25, has been for several years under Mr. Streatfeild's care for incomplete cataracts. Her right lens was first affected. At present she has marginal and posterior striæ in each lens, and in addition numerous very small round opacities scattered all through the substance of each lens, though most numerous in the right.

Case IX.—*Several attacks of Gonorrhœa followed by liability to severe Fascial Rheumatism, and to relapsing Balanitis in association with Rheumatism—Recurrent Iritis of both Eyes, with Secondary Cataract of one—Disorganization of the Cataractous Eye and almost complete Blindness of the other—History of remote Syphilis doubtful; certainly no recent Syphilis.*

Joseph K., æt. 35, a short spare man, with dark hair. He is married, and has had five children. It is probable, though not quite certain, that he has never had constitutional syphilis; he admits having had a chancre several years ago, and perhaps it was at the same time (but of this he is uncertain) that he had a sore throat, which he says the doctor considered to be "venereal." He denies ever having had a skin rash.

He has had gonorrhœa several times, and it was not until after one of these attacks that he had rheumatism for the first time. He has since had many attacks of rheumatism, and has often been laid up by it for two or three months at a time. It affects the "muscles," and his joints do not swell.

He has on several occasions had attacks of profuse balanitis, and his impression is that they come on spontaneously in association with his rheumatism; he believes that he generally has both rheumatism and balanitis in the spring and autumn.

He was first sent to me in the spring of 1870 by Mr. Steele, of Reigate, on account of iritis of both eyes; there was also cataract in the right, which, according to his statement, had been forming for several months before he had any pain or inflammation in the eye. He said that people used often to notice it, but that as it gave him no pain he took no heed of it. He had rheumatism very badly when I first saw him.

I again saw him in March, 1871, when he came under care for a relapse of iritis in his left eye, and in the right a corneal ulcer which had perforated before I saw him. His right eye had been inflamed for three months, and his left for six weeks on this occasion. He had had rheumatism with this attack of iritis; and at this time, as well as on his first visit to me, a year earlier, he had profuse balanitis. The iritis in the left eye became worse; the whole iris became muddy, and the pupil obscured; there were no nodules of lymph, and the whole attack was not accompanied by much pain. The right was quite lost when he came to me the second time, its tension diminished, iris in contact with cornea, anterior chamber leaking through a fistula left by the perforating ulcer, and lens opaque. I advised its removal because quite useless, and a possible source of irritation to the other eye. At the same time I did an iridectomy in the left eye. The iritis continued in a slow chronic form, and the artificial pupil became gradually almost blocked, so that three weeks later I made another iridectomy. Vision remained about as before the operations, and was extremely defective. There was never any increase of tension. He was taking bichloride of mercury in full doses, and, later on, iodide of potassium, during the whole of this second attack.

The excised eye was quite disorganized; the choroid was widely separated from the sclerotic, and the retina from the choroid; the spaces between these tunics were filled by bloody fluid, and there was much cholesterine lying loose on the choroid. The epithelium of the choroid was disturbed in places, and accumulated into dense heaps of black. The lens was opaque.

CASE X.—*Chronic painless Iritis ending in Exclusion of Pupil —One Eye affected four years before the other—Long history of Sick Headaches and of Epistaxis—Patient Anæmic and weak when the Iritis began, and afterwards—Family history of Gout.*

Wm. Y., æt. 54, was formerly a compositor, but for the last seventeen years has kept a grocery shop. He has rather coarse and almost black hair, and is getting bald on the top of his head. Many of his teeth have decayed. He is pale and feeble, and has been more or less out of health for several years.

His iritis began about six years ago, in the right eye, at a time when he was very debilitated. A year later he was under Mr. Dixon's care for the iritis, and twelve months ago an iridectomy was done in the same eye by Mr. Bader.

Two or three years ago the left eye began to fail. He has had very little pain in either eye, but his wife asserts that there has been a good deal of redness sometimes.

At present his right eye is blind and its tension diminished. It was probably unsound when the iridectomy was done, for no improvement followed that operation. Its artificial pupil is irregular from adhesions. The lens is opaque. The left just sees large letters, and the pupil is excluded.

After the above notes were taken I performed a downward iridectomy in the left, and considerable improvement followed.

This patient has had slight "rheumatic" pains in various parts, but no definite arthritic symptoms. His father suffered from gout in his feet, and used to be laid up with sudden severe attacks.

Wm. Y. has, ever since he can remember, been subject to bad sick headaches. They are often brought on by fatigue, or by eating things that disagree; he is "obliged to be very particular in his food." Has never been jaundiced.

From early boyhood he has been very liable to epistaxis; he attributes its commencement to a severe blow which he had on the nose when he was seven years old; the blow has left a scar. The bleeding has been worst in hot weather and after exertion, he has seldom lost much blood at any one time, but has often felt faint after a bleeding. This bleeding has on the whole diminished as he has grown older.

Case XI.—*A mild attack of Iritis in one Eye followed two weeks after recovery by severe Iritis of the other, in a young Woman —Arthritic Achings and Neuralgia in the Patient and her Sister, and history of Fascial Rheumatism in the Father.*

Emily M., æt. 20, unmarried, has been a barmaid for five years, and is much exposed to draughts and damp floors. She comes on account of iritis in her left eye; there are no nodules of lymph on the iris, but there is much congestion of the eye and great pain. It has been inflamed for a week. Five weeks ago the right eye was inflamed, but she says that it was never so bad as the left now is, and it got well in about a fortnight. She has never had anything wrong with her eyes before.

There seems no reason whatever for suspecting that she is suffering from secondary syphilis; careful examination of throat and skin, and questioning, give an entirely negative result. She appears to be in excellent health.

She is liable to pain, which she calls "rheumatic," in her left shoulder, and to occasional aching in her knees, and quite lately she has had an aching in her right hand. She is also subject to neuralgic pains on both sides of her head. She considers herself very "bilious," that is, subject to nausea and frontal headache, and she is obliged to carefully select her articles of food.

Her father is subject to severe lumbago, and to shooting pains in his head; he is sometimes laid up by the severity of the pain in his back. Her sister also has the same rheumatic shoulder pains as the patient herself, and is liable to similar neuralgia in the face and head.

Case XII.—*Numerous attacks of Iritis in one Eye only (the right) —Patient subject to Gout, which he inherits for two generations on the Father's side.*

Henry J., æt. 62, was under care for iritis of his right eye; there were many adhesions, much ciliary and conjunctival congestion, and considerable pain. He came to me first in May of the present year (1871), and again had a slight attack in September.

He says that he has been liable to inflammatory attacks in the right eye for about thirty years, and that the left eye has

never, so far as he remembers, been affected. For thirty-five years he has been subject to gout; the first attack was in his left foot, but since then he has had it in almost all his joints, and about equally badly on both sides. His last attack of iritis and of gout occurred at the same time, in September.

He has urate of soda concretions in the ears, in the fingers, and on the edge of the upper eyelid. The deposit in the eyelid was examined microscopically, and found to consist of small needle-shaped crystals. He has lips on his femoral condyles, and grating in the knee joints.

Many of his relations on the father's side have had gout. His father had it, and his father's father, also a paternal uncle and some male cousins on the father's side. He knows of no female relatives who have had it, either on father's or mother's side.

Case XIII.—*Hereditary Gout, beginning at the age of seven and ceasing at thirty-five—Influence of abstention from Malt Liquor —Several attacks of severe Rheumatism not leaving permanent changes, in the same Patient—Repeated attacks of unsymmetrical Iritis, some of them in connection with Rheumatic attacks in the Joints.*

Wm. T., æt. 50, a "brassfounder," who works in lead and arsenic, as well as copper, had his first attack of gout at the remarkably early age of 7 years, and after that he had many attacks in various joints. The first attack was in his right foot. He describes characteristic attacks of gout. Since the age of 35 he has had no gout at all, and he attributes this immunity to his having left off beer, &c. Up to the age of 22 he drank a moderate quantity of beer regularly, but since that time he has scarcely ever taken any alcoholic liquor except gin. He has never had symptoms of lead poisoning.

He has also had three attacks of "rheumatic fever." The first came on when he was 22, a few days after he had fallen into the water on a hot day. The last attack occurred when he was 34 years of age. He says that the doctors used to listen to his heart when he had the rheumatic fever. He was, at least once, laid up by it for several months. He describes swelling of all the joints, but says that they did not *shine* as in his gouty attacks.

He asserts that his eyes inflamed for the first time during his first attack of "rheumatic fever," at the age of 22. He has since then had five attacks of ocular inflammation, sometimes in one eye, sometimes in the other, and I have treated him for the last three of these. There has been on each occasion well marked iritis of one eye only, sometimes the right, sometimes the left. The attacks generally come in January, but the last occurred in July. His recent attacks of iritis have not been accompanied by any joint affections. He has slight grating in his right knee, and perhaps small lips on the condyles, but they are doubtful.

His father was, like himself, a brass founder; he did not suffer from either gout or rheumatism. The patient's paternal grandfather, however, had gout severely. No other relations known to be arthritic. The patient is one of seventeen brothers and sisters, fourteen of whom are living.

Case XIV.—*Unsymmetrical Iritis in a Man who had had severe Rheumatic Inflammation of the corresponding Knee five years before—The Rheumatism following two years after Gonorrhœa —No Syphilis.*

Edwin E., æt. 38, is a traveller in drapery. He is of spare build, has dark hair, and is becoming bald on the top of his head. He came in August with a first attack of iritis in his right eye; there were no nodules of lymph on the iris. The cornea was hazy, and there was much congestion and considerable pain, especially at night. The other eye was perfect, and there were no signs of iritis after atropine.

A careful examination of his throat, skin, and genitals revealed no evidence of syphilis, either recent or remote, and he denied all history of chancre or other symptoms.

He stated that seven years before I saw him he had a gonorrhœa; it was not severe, and lasted about a month. Two years afterwards he had severe rheumatism of his right knee, and was laid up by it for six months; the joint was much swollen. No other joints were affected. Since that attack he had very often had flying pains about the shoulders, loins, &c.

He knows of no arthritic history in the family. His father died at 43 after an accident.

CASE XV.—*Two severe attacks of Rheumatic Fever in youth followed by complete immunity during the child-bearing period, and by another severe attack soon after the permanent cessation of Menstruation—Iritis in one Eye at age of 45—Several relations of the same generation arthritic; no ancestors known to be so.*

Mrs. B., æt. 45, came under my care in September, 1871, for an attack of iritis in the left eye. It had lasted about six weeks when I saw her, and the iris was at that time discoloured and showed many adhesions. Her eyes had never been inflamed before. She gave me the following account of her arthritic complaints:—

At the age of 10 years she had a severe attack of rheumatic fever, with affection of the heart, and was expected to die. At 18 years old she had a second attack of rheumatic fever, after which she remained quite free from any rheumatic symptoms whatever until October, 1870. At that time, after she had been doing a good deal of house cleaning, kneeling about the floors, &c., she was again confined to bed for between two and three months with a severe attack of rheumatism. The knees, hips, elbows, shoulders, feet, and hands were all affected. The finger-joints and knees were especially swollen, and she said that "the fingers were drawn to one side." It may be noticed in connection with this attack, that menstruation, which had previously been regular, ceased four months before the rheumatism came on. She has never had sick headaches.

Her eldest sister suffers from what the patient called "rheumatic gout," and a brother, also older than the patient, had rheumatic fever in his youth. This brother's daughter has suffered from what the patient calls "rheumatism," and through it has lost the use of one arm. Mrs. B. does not know of any history of gout or rheumatism in her parents or in any members of a former generation, but it is very probable that her knowledge of the history of her ancestors is imperfect.

CASE XVI.—*Numerous attacks of Rheumatic Arthritis and of Iritis in old age—No known family history of Arthritic Diseases—The Iritic attacks generally brought on by exposure to cold wind.*

Sarah W., æt. 70, has had very numerous attacks of iritis in

each eye, and her pupils are now excluded. For several years her lenses have been gradually becoming cataractous.

For about six years she has been subject to attacks of rheumatic arthritis in her knees, ankles, wrists, fingers, &c. The affected joints swell and get stiff, but she is seldom laid up on account of the rheumatism. With reference to the relation between the iritis and the rheumatism, her evidence is that both affections are brought on by cold, and she is emphatic in her assertion that exposure to cold wind is generally followed by an iritic attack. The rheumatism and the iritis commonly occur at about the same time. The earlier attacks of iritis lasted longer and were attended by more pain than has been the case lately; now each attack generally lasts only two or three days. Only one eye is affected at once. She has distinct lips on the condyles of her right, and probably of her left femur also, and there is crackling in the left knee. The joints of her fingers are rather thickened, but neither these nor any other joints are stiff.

There is no definite family history of arthritis. The patient thinks that her mother suffered slightly from rheumatism of her joints in old age, but her account is indefinite.

Case XVII.—*Rheumatic Arthritis and Neuralgia attacking a young man (who inherits the Rheumatic diathesis) for the first time after a Gonorrhœa—Unsymmetrical Iritis several years after the Gonorrhœa—Doubtful History of remote Syphilis; none of the recently acquired disease.*

William G., æt. 28, has been for six weeks under care for iritis of his right eye only; he has never had anything amiss with his eyes before. It seems most probable that the attack is arthritic in its nature, although the evidence is not so full as to place the matter beyond doubt.

Six years ago he had "gonorrhœa;" discharge from the urethra continued for three months, and he says that he had some rash on the skin at the same time. His eyes did not inflame then. He married a year later, and his wife has been pregnant four times. There is nothing more than the slightest suspicion to be attached to the history of her children, and two of them, who are brought by the mother, show no evidences of inherited taint. The mother (his wife) has had good health since

marriage, and gives no history of any constitutional symptoms of syphilis.

About six months after his gonorrhœa he began for the first time to suffer from rheumatic pains in his knees and shoulders, and "in his head." The pains were sharp and shooting, commonly lasting only a few minutes, and seldom more than half an hour, and never accompanied, according to his statement, by swelling of the joints.

His youngest sister is also very subject to severe darting pains in her head, "rheumatics in the head," and his father was rheumatic, and used to be laid up with rheumatism in his knees, shoulders, &c.

The patient has decided lips on his right femur, and probably on the left also.

NEW STRABISMUS HOOK—TEST-TYPES.

By George Cowell, F.R.C.S.,

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The strabismus hook, of which the accompanying woodcut is a representation (exact size), has been made for me

by Messrs. Weiss and Co., of the Strand. It is a modification of Von Graefe's hook, although intended for the subconjunctival operation. The end from the extremity to the bend is much shortened; the bend is more abrupt, and a second bend at a very much larger angle is placed at about five lines from the former. It is important that it should be as fine as shown in the woodcut, as if it be thicker, or more probe-pointed, its introduction is apt sometimes, unless great care be taken to detach the conjunctiva a little more than is necessary, a matter of some importance when operating for very slight degrees of strabismus. To place the tendon of the muscle to be divided on the stretch, the hook having been introduced, is held so that the portion of it between the two bends is at right angles to the fibres, and the end very effectually prevents the escape of a portion of the lateral fibres before the tendon is completely divided, an occurrence which is the cause of a large percentage of the failures in operations for squint. The second bend enables the operator to get the handle of the instrument well out of the way of any interference with the play of the scissors.

Messrs. T. Brettell and Co., of 51, Rupert-street, Hay-

market, have printed for me a set of test-types for determining the acuteness of vision. They are drawn up to correspond as nearly as possible with those of Dr. Snellen, of Utrecht, and as supplemental to his well-known book of test-types, will tend to prevent the disproportionate wear and tear of its first two pages, the long useful types of Prof. Jaeger being useless for the expression of V in a fractional form. The limbs are, as in Snellen, in diameter about one-fifth of the height of the letters, and the figures over each size express the number of feet at which the letters are seen by a standard eye. Words of one syllable are chosen, and verses are used, as facilitating the testing of the eyes of those who read imperfectly; and a line of small capitals is introduced where practicable, for similar reasons. There is also a greater variety of the smaller types, commencing with brilliant (1).

Should these types be favourably received, it is proposed to print a piece of *prose*, composed of small words, to correspond. Copies of the above can be obtained of the printers.

INFLAMMATION OF UVEAL TRACT, OCCURRING IN A FATHER AND THREE SONS—RIGHT EYE PRIMARILY AFFECTED IN ALL—LEFT EYE SUBSEQUENTLY ATTACKED IN TWO—IN FOUR EYES THE LENS WAS CATARACTOUS—PROBABLY SYPHILITIC—MOTHER THE SUBJECT OF CONGENITAL CATARACT.

By George Cowell, F.R.C.S.,

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Of the family whose cases are narrated below, the first member whom I saw was the youngest son, Walter, now eight years of age. He was brought to the Moorfield's Hospital, in December last, on account of "blindness" of the right eye, and was found to have mischief in the eye, which had produced detached retina. On inquiring for some history of the case, I was told that his two brothers and his father were also "blind of the right eye," and that "the father was blind from cataract." I therefore requested the attendance of these members of the boy's family, and also of a sister a little older than himself, who was said to have good eyes. The various members of the family attended, as requested, on January 4th, and I was thus enabled to ascertain the following particulars, which appear to be of sufficient interest to be worthy of record in the Ophthalmic Hospital Reports:—

1. The father, Ernest L. V. S., a German by birth, 56 years of age, has white hair and florid complexion, presenting somewhat the aspect of an Albino, and is in good condition. He has, however, been so blind for the last three years, that he has had to be led about. The right eye became inflamed (iritis) 17 years ago; the left was similarly affected a few years later. For one of these attacks he was salivated. Nine years ago, his sight having remained considerably impaired, he went to visit his

relations in Germany, and whilst there had an operation performed in both eyes (iridectomy inwards), without, however, arresting the gradual destruction of the visual power.

There is now no perception of light in the right eye, the lens is cataractous and shrunken, and partially detached, so that it shakes about when the eye is moved. There is some slight ciliary injection, with occasional attacks of slight pain, evidently calling for removal of the lens. In the left eye there is perception of large objects, as shadows passing before the eye. There is a diffused opacity of the lens to which there are several adhesions of the iris, and a few striæ, and there are some floating bodies in the vitreous. In this eye there is a bundle of persistent white nerve-fibres on the lower and outer side of the disc. There is a fair pigmentation of the choroid.

This patient denies having had syphilis. He has never had ulcerated throat, but has had a rash on the arms and legs several times. He confesses, however, to having had some 19 years ago, great swelling and soreness of the genitals for about two weeks, but attributed it to having got wet on a journey. This occurred from $1\frac{1}{2}$ to 2 years before the first attack of iritis. The probability of a syphilitic history is strengthened by the fact that his wife had two miscarriages before any living children were born, and a third after the birth of the second son (Ernest).

The wife died about a year ago, 49 years of age. When 8 years old, she was subjected to operation at Moorfields for double congenital cataract, and is said by her family to have been able to see "very well."

2. Charles S., the eldest son, is 17 years of age, and is of somewhat a cachectic aspect. His central incisors are broken away, but the lateral incisors are badly formed and slightly notched, though not thoroughly of the form described by Mr. Hutchinson as typical of hereditary syphilis. The right eye was quite lost ten years ago from iritis. The globe is now soft, the pupil closed, the iris discoloured, and a pinkish zone round the cornea. The lens is evidently cataractous, and the globe has been occasionally painful, although free from pain during the last few months. The left eye has gradually become amblyopic during the last four years. He only reads, with difficulty, letters of No. 20.

The ophthalmoscope shows peripheral detachment of the retina all round, most upwards and as much inwards as downwards. There is also some subretinal effusion around the disc. The eye is hypermetropic.

The right eye was excised on January 15th, and I am indebted to Mr. Edward Nettleship for the following very complete report of its examination.

Immediately after excision it was found to be slightly shrunken, squared, and very soft. The cornea was clear and its anterior surface smooth; at its lower part there was a small semi-transparent elevation, like a granulation or heaping up of epithelium. The iris was yellowish-blue, the pupil small and round, and occupied by an opaque white substance. (After being hardened for two days in a weak (about 1 per cent. solution of chromic acid), the globe was bisected vertically in the antero-posterior direction). The anterior chamber was deep. The iris was found to be closely adherent by its inner part (corresponding to the inner vascular circle) to the lens-capsule, so that the pupil was quite excluded. The substance of the lens was opaque and semi-fluid; the anterior layer of the lens-capsule was opaque, calcified, and much thickened; the posterior layer had many opaque, white dots upon it, but was not thickened.

The *choroid* was in contact with the sclerotic everywhere. At its equatorial part were two large patches of tough, firm, white fibrous tissue; one was on the temporal side, the other on the nasal side, and with the latter the membranous diaphragm was connected, as hereafter described. The epithelial layer was altogether absent in a good many places, but was on the whole sufficiently well preserved to give a tolerably uniform brown colour to the inner surface of the choroid when examined with the naked eye.

Everywhere, however, the individual epithelial cells were much altered; their outlines were often indistinct or altogether lost; their pigment granules scanty, and in many cases collected together to one side of the cells, while in others the individual granules were much larger than normal. Some of the epithelial cells were too small; but a considerable number occurring either singly or in groups, were very much enlarged, and these instead of being flat, had become globular, so that they stood out on a higher level than their companion cells. The enlargement seemed

to be due to distension of the cells, with a colourless, faintly, and finely granular matter; the nucleus was sometimes noticed to be enlarged; the pigment of these enlarged cells was almost always pushed away from the subjacent choroid, and lay in the part of the cell nearest to the retina. The larger groups of distended epithelial cells formed abrupt elevations upon the inner surface of the choroid quite visible to the naked eye. The size of these little hillocks was, however, much greater than would have been the case if they had consisted solely of epithelial cells, for, beneath the cells, between them and the elastic lamina, there could always be seen a quantity of finely granular matter, and this in fact constituted by far the chief part of the larger hillocks. The granular matter closely resembled that which formed the contents of the enlarged cells, from which indeed it could not always be easily distinguished; it generally showed signs of being arranged in more or less globular masses somewhat larger than the enlarged epithelial cells; the outlines of these globular masses were exceedingly indistinct, and the appearance produced was suggestive of an incomplete fusion of the various masses into a single large one; the granular matter of which each globular mass was composed, was arranged indistinctly in fine lines radiating from its centre. Thus, the larger hillocks when divested of epithelium (and many of them were quite bare), had an appearance which reminded one slightly of a compound spherical crystal composed of radiating needles. The bases of the large hillocks (colloid bodies) were more or less contracted, while the entire colloid bodies were often half imbedded in pits caused by depressions in the elastic laminæ. No vessels were ever seen to enter the colloid bodies, and the elastic lamina could always be traced beneath them. None of them were calcified, at least not sufficiently to grate when cut or touched; they were probably albuminous. They were very numerous, being scattered about thickly on most parts of the choroid. The elastic lamina was present everywhere; it was not thickened, but was often more or less puckered. This puckering was carried to the greatest extent in the neighbourhood of the optic disc, where it was so extreme as to simulate the papillæ of skin. In the same part, around the disc, the choroid was much thickened, and quite devoid of epithelium. The thickening was due especially to changes in the chorio-capillaris, the vessels of which were much

enlarged, and mostly distended with blood; the tissue between the vessels was much increased in quantity, and contained round inflammatory cells. The deeper (pigmented) layer was also thickened, and contained large quantities of pigment cells. In other parts of the eye, at some distance from the disc, the thickening was confined entirely to the chorio-capillaris. The processes of the stellate pigment cells in many instances were deficient, the cells being oval, or even round. Projecting from the optic disc was a soft fleshy mass as large as a small bean, rounded and solid. On its hinder surface, and surrounding the disc completely, was a thin plate of bone forming a shallow cup. This plate of bone was quite separate from the choroid, although almost in contact with it, and it adhered firmly to the fleshy mass in front. There was a central aperture through the bony plate, through which a cord of attachment passed from the disc to the fleshy mass. I was in doubt as to whether or not the mass referred to was a new (inflammatory) growth which had begun to ossify, or the shrunken retina, until I examined it microscopically. There then remained no doubt that it was the retina which had become entirely detached (except from the disc), and was shrunken up into a solid mass. It consisted entirely of elongated Müllerian fibres, and of mesh-works of connective tissue, and indications of the foldings and puckering which it had undergone could still be observed. The layer of bone was intimately adherent to its outer surface, and appeared to have been formed in a layer of fibrous tissue, whose elements ran parallel with the outer limiting membrane, and which was continuous with the edges of the bony plate. The bone contained abundant bone-corpuscles with processes; the long axes of the bone-corpuscles were parallel with the fibres of the unossified fibrous tissue above mentioned. The retina was well supplied with blood. The *ciliary body* was shrunken, but the ciliary processes were well preserved. Stretching across the eye, and forming a complete diaphragm, was a semi-transparent tough membrane, with pigment patches on its front surface. Its circumference was attached to the ora serrata, excepting at the temporal side of the eye, where it was continuous with one of the tough white patches of scar-like tissue on the inner surface of the choroid. At one part of its circumference there was a small crescent of bone about $\frac{1}{4}$ inch long, and of triangular shape on section; this bone

was attached by its base to the ciliary body immediately in front of the ora serrata, while its ridge projected into and was continuous with the membranous diaphragm. The membranous diaphragm was in contact with the centre of the back of the lens, and no doubt represented the very much altered hyaloid. Between it and the retina was a clear fluid containing abundant well-formed cholestearine crystals. The sclerotic was a good deal thickened, especially around the disc and along the upper half of the globe.

In this eyeball there had been inflammation of almost the entire uveal tract, attended by effusion of inflammatory products into the vitreous chamber (at least its front part), and between choroid and retina. Hypertrophy of the retinal connective tissue occurred either before or at the same time as the total detachment of that membrane. Subsequently all the tissues involved underwent shrinking. The thickening of the choroid was partly due to shrinking, but chiefly to hypertrophic inflammation, and the latter change was especially marked in that part of the choroid surrounding the disc.

3. The second son died of rheumatic fever, at the age of 13. His eyes were good. He was left-handed, the only member of the family who was so.

4. The third son, Ernest, is 13 years old. He is as well as his eldest brother, pale, and somewhat badly nourished. He had iritis (right eye) $1\frac{1}{2}$ year ago. There are now several posterior synechiæ, and a cataract of apparently a soft character. The tension of the eye is normal, and there is good quantitative perception of light. The left eye is slightly hypermetropic, with a crescent by the optic disc, $V = \frac{20}{30}$, and he reads No. 1 at 1″.

5. Louisa, the next child, is $10\frac{1}{2}$ years old. Her corneæ and lenses are perfectly clear. There is no deafness now, but she is subject to attacks of ear-ache on the left side, two or three times a year. During the attack and for a short time afterwards there is some deafness on that side. She is somewhat pale and anœmic.

6. Walter, æt. 8, is well nourished, and without the slightest aspect of an hereditary syphilitic taint. He bears a remarkable resemblance to his father, and is the only one of the family that does so. He can with a little difficulty count fingers with the right eye, but with the left he can read No. 2 easily. There is

no history of injury to the eye. The dimness of vision has come on gradually during the last $1\frac{1}{2}$ or 2 years. The tension is normal, and equal in the two eyes.

An ophthalmoscopic examination shows that in both eyes the lens is perfectly transparent. In the right eye, the vitreous is slightly cloudy, and contains numerous floating bodies; the retina is detached peripherally in all directions, the width of the detachment varying, and being slightly greater at the lower part. There is also some detachment (effusion beneath the retina) round the optic disc, giving the margin of the disc an indistinct appearance, which led at first to the impression that there was optic neuritis, though a careful examination showed that no neuritis existed. The choroid was throughout thin, and remarkably deficient in pigment. In the left eye, the choroid presented the same appearance; there were a few floating bodies in the vitreous, and the disc was whitish, with a somewhat irregular outline, but with no distinctive signs of previous neuritis. There was no detachment of the retina. Both eyes had a hypermetropic refraction.

Two or three other children died in infancy, one "from convulsions," but I could ascertain nothing with regard to them worthy of remark.

These are the facts, as far as I have been able to ascertain them. The cases, occuring as they do amongst the members of one family, offer many points of interest. The first point that strikes one is the uniform appearance of the disease primarily in the right eye. There is no apparent reason for this, for there seemed to be no special unilateral peculiarities in the family, nor could I hear of any having existed amongst ancestors or relatives. The father was slightly smaller on the left side than on the right, but the eldest son was slightly smaller on the right side. The son who died at 13, of rheumatic fever, was said to be left-handed, the only instance of that peculiarity in the family. Although the right eye was the first to be affected, in two instances, those of the father and the eldest son, the left eye did not long escape; and it is curious to observe the similarity between the affections of the left eye of the eldest

son and the right eye of the youngest. In both these eyes, and perhaps also in the father's left eye, similar changes are going on; detachment of the retina is proceeding from the ora serrata backwards, and from the optic disc forwards, and very considerable light is thrown upon the process that is going on, by the examination of the right eye of the eldest son, which was removed. Again, the frequency of cataract is a prominent feature. It is said that cataract is always secondary. Here it is most unmistakably the result of inflammatory changes in the eye, and in the case of the third son coming on pretty quickly after their first appearance. Two of the affected eyes have, however, escaped, the lenses at present remaining transparent. The question arises, is cataract so common in these inflammatory affections of the eye, or can the frequency of its occurrence in the present family be in the slightest degree explained by an hereditary tendency. It will be observed that the mother was the subject of congenital cataract.

With regard to the history of syphilis, I think that here we have, in the absence of direct evidence, a sufficient number of facts to justify the conclusion that there is a strong probability in favour of the syphilitic nature of these cases. There are the admissions of the father, the aspect of the elder sons, the miscarriages of the mother, and the concentration of the disease in the elder children.

It will be interesting to watch these cases, and to note the changes which seem to be gradually advancing, and not least to ascertain whether and how soon the lenses which are still transparent will lose their transparency.

ON ŒDEMA, OR CYSTIC DISEASE, OF THE RETINA.

By Edward Nettleship, F.R.C.S.,

Curator of the Royal London Ophthalmic Hospital Museum.

The pathological condition to which the following remarks apply has been already fully and accurately described by Dr. Iwanoff, under the title first of "Colloid Cystic Disease of the Retina,"* and, secondly, of "Œdema of the Retina;"† and a figure of the latter condition is given by him in the *Archiv. f. Ophth.* It was also described and figured by Dr. R. Blessig‡ in a pamphlet on the minute structure of the retina; he regarded it, however, as the normal condition of the retina between the equator and the ora serrata.

With regard to the structure of the retina in the state described by Dr. Iwanoff as "œdema of the retina," and the state intermediate between that and the formation of cysts in the outer layers of the retina, I have nothing of importance to add to the description given by that author. In two specimens, however, which I have examined, the relation of the "œdematous" or "cystic" part of the retina to the outer tunics of the eye was such as to suggest that some inflammatory affection of the sclerotic and choroid, followed by bulging outwards of those tunics, had been instrumental in causing that outward growth§ of

* "On various forms of Inflammation of the Retina," read before the Ophthalmological Society of Heidelberg, Sept. 5, 1864, and published in Zehender's Klin. Monatsb, I., vol. ii, p. 415 (1864).

† Archiv. f. Ophth. Fünfzunter b., abth. ii, p. 88 (1869).

‡ "De retinæ textura disquisitiones microscopicæ. Dissertatio inauguralis, &c." R. Blessig (1855). Dorpat.

§ Mr. Hulke, to whose kindness in overlooking this paper and making valuable suggestions I am much indebted, thinks that the word *growth* should not be used to express the observed changes in Müller's fibres, at least not in the present state of our knowledge. Mr. Hulke suggests "*extension*," or some similar word, which, while it describes the appearances does not involve any

Müller's fibres, which constitutes the most marked feature of the retinal change. In a third specimen I found some evidence of the former presence of adhesions between the outer surfaces of the patches of "œdematous" retina and the inner surface of the choroid, again pointing to the previous occurrence of localized inflammation.

The condition named by Dr. Iwanoff "œdema of the retina," is produced, as he has shown, by the following changes:—1st, a great increase takes place in the length of the vertical connective-tissue fibres of the retina; 2nd, more or less atrophy of the granule layers and of the nerve-cells and nerve-fibres occurs; 3rd, while the above changes are going on, spaces, at first small, afterwards much larger, are formed between the hypertrophied Müllerian fibres. These spaces are irregular in shape and size, and are many times wider than the individual Müller's fibres, being separated from one another by the thickened and elongated bundles of those fibres. They occur first in the outer granule layer, then in the inner granule layer, the inter-granule layer remaining for a time as a horizontal septum between them. This septum finally disappears, and the two sets of cavities coalesce. The overgrowth of the connective tissue pillars may continue long after the total disappearance of the inter-granular layer, and in such advanced cases the retina is seen to consist chiefly of tall thick pillars of straight connective-tissue fibres separated by spaces, the diameter of which is from three to four (or even more) times that of the pillars. The spaces alluded to are stated by Dr. Iwanoff to contain albuminous fluid; in the specimens that I have examined there has been no evidence of the

theory of their causation. I purposely, however, use the term *growth*, because it seems to me that the changes observed in Müller's fibres in this condition can scarcely be accounted for by any other process. If the elongation of these fibres were produced by *stretching* alone, it would not be accompanied by an increase in the thickness of their bundles, whereas increased *thickness* is not less a characteristic of the change in question, when well marked, than increased *length*.

presence in the spaces of any coagulated material, although they had been subjected for a considerable time to the action of chromic acid. The hypertrophied connective-tissue pillars terminate at each end by expanding into the outer and inner limiting membranes, and it is easy to demonstrate that these two membranes are made up by the interlacing of the very numerous and very fine fibres into which every pillar divides after thus expanding. In the neighbourhood of each limiting membrane a number of round granules are found among the Müllerian fibres, and some of these are found scattered throughout the entire length of the pillars. They resemble the normal retinal granules, of which they are probably the remains. Oval connective-tissue nuclei are also found in connection with the fibres, but, so far as my observation goes, they are almost confined to the immediate neighbourhood of the internal limiting membrane, and to the fibres which make up that structure. In one of my specimens there were small cavities also in the nerve-fibre layer. The rods and cones remain unaltered for a long time, until the spaces have become of considerable size; ultimately, however, they disappear. In the specimen which showed all the changes in the most advanced condition, there were in the outer part of the diseased retina, beneath the outer limiting membrane, numerous pigment masses having the size and colour of the choroidal epithelium, from which layer they were doubtless derived.

Dr. Iwanoff, in his earlier publication on cystic disease of the retina, considered that the cavities in the outer granule layer which constitute the cysts, resulted from the formation of "colloid" masses between the overgrown connective-tissue pillars, the "colloid" masses themselves being, at least in part, the result of degeneration of the granules of the outer granule layer. In his later paper on "Œdema of the Retina" (which condition he there considers as an early stage of the form described as "cystic"), he suggests that granular or calcareous degeneration of

the capillary blood-vessels may, partly at any rate, explain the changes observed. I have already mentioned that signs of past inflammation in the sclerotic and choroid covering the diseased portions of the retina led me to suspect a mode of origin different from either of those suggested by Dr. Iwanoff. Thus, in two specimens where the changes above described in the retina were well marked, and in which there was no detachment, the corresponding parts of the choroid and sclerotic were thinned, and a uniform bulging of these two tunics outwards was present at the thinned part. The outer surface of the retina in these specimens followed the altered curve of the staphylomatous sclerotic and choroid, being in contact everywhere with the latter. The inner surface of the retina, on the other hand, retained its normal curve, so that the two surfaces were widely separated from each other, being of course connected by the pillars of overgrown Müller's fibres.

The *first* of these specimens is described in the 2nd part of Vol. VII of this Journal, p. 204. It was found in an eye lost by glaucoma, secondary to kerato-iritis. The patient was the subject of inherited syphilis. It is difficult to account for the yielding of the sclerotic and choroid in this case without supposing that these tunics became softened from an inflammatory process, and then yielded to the increased intraocular pressure. This hypothesis is borne out by the degenerated and atrophied state of the choroid at the part referred to, and by the fact that many pigment granules had passed in from it to the subjacent retina; and again, pointing in the same direction, was the presence in some parts of a thin layer of effusion between the choroid and retina. On the other hand, there was no abnormal adhesion between retina and choroid, at the part where the latter bulged outwards, and we can therefore scarcely account for the retinal alterations by supposing the outer layers to have been drawn away, in company with the choroid, from the inner layers. The fact that the inner layers of the retina did not participate in the staphyloma is no proof that the latter was not produced immediately by the increased ocular tension, since great increase

in the intraocular pressure may co-exist with most extensive detachment of the retina.

The *second specimen* was from Jemima S., a single woman, æt. 56, under Mr. Critchett's care. Two and a half years before excision her right eye rapidly failed. She asserted that the eye became blind in a single night, and that the attack was not accompanied by pain. The blindness was permanent, and the eye had occasionally been painful since it became blind. The pain having increased, Mr. Critchett removed the globe. The other (left) eye became glaucomatous three months before the right eye was excised. Mr. Critchett performed iridectomy on the left.

Condition at time of Excision, July 11, 1871.—R. eye quite blind; T + 3. Cornea hazy from epithelial disturbance and superficial vascularity. Pupil wide and round. After excision a commencing equatorial staphyloma was noticed above and below, behind the superior and inferior recti muscles; there were also in other parts lines of dark colour running in the antero-posterior direction, and looking as if produced by splitting of the sclerotic.

The eye was placed for two days in chromic acid, and then opened in the antero-posterior direction.

There was no adhesion between the iris and the lens capsule. The *lens* was for the most part opaque; it was normal in size. The *vitreous* presented nothing unusual to the naked eye. The *retina* was everywhere in apposition with the choroid, but at the staphylomatous parts its outer layers alone followed the altered curve of the attenuated sclerotic and choroid. Its inner layers preserved their normal curve, and the retina thus appeared to be split into two divisions. Between the opposite surfaces were stretched numerous pillars formed of the elongated fibres of Müller. The rods and cones were well preserved in the parts which had undergone the above changes. The conditions resembled those found in the first specimen in all essential respects, but were less extensive both in area and in the distance by which the opposite surfaces of the retina were separated. There were no signs of pigment having passed from the choroid into the retina in this specimen. The *choroid* was everywhere in apposition with the sclerotic, and presented no other signs of disease to the naked eye, except the thinning which had occurred

at the staphylomatous parts. The same remarks apply to the *ciliary body* and to the *sclerotic*.

The *third specimen* was the left eye of Mrs. O., æt. 66, a patient under Mr. Hutchinson's care.

History.—She had a *musca* before the left eye for several years before its sight became seriously damaged. About two and a half years before excision the eye rapidly failed. It was not painful, but "a green gauze" appeared before the sight. When she applied to Mr. Hutchinson, a few days after the failure, there was only slight perception of objects held to the temporal side, and detachment of the retina was diagnosed with the ophthalmoscope. The other eye was nearly perfect. In May, 1871, two and a half years after the failure of the left eye, she again applied, complaining that for four months past the eye had been painful, and that the pain had been still more severe for the last fortnight. The pain was "like rheumatics in the eye" and kept her awake at night. The eye was quite blind; T considerably in excess; a central shallow ulcer was present on the cornea; the lens cataractous; the eyeball much congested. It was excised the same day. The other (right) eye showed floating bodies in the vitreous, a large posterior staphyloma completely surrounding the disc, and some general thinning of choroid; it was found to have $\frac{1}{20}$ of myopia.

The left eye was hardened in chromic acid and then opened.

The *lens* was opaque at the centre, but otherwise normal. The *retina* was detached in the form of an umbrella, and its hinder part, near the disc, a good deal shrunken and thickened. In most places the detachment extended quite up to the ora serrata, but there were still a few spots of adhesion between choroid and retina at a little distance behind the ora serrata. At all these spots of adhesion there were, however, signs of inflammatory changes in the choroid, the retina seeming to have been left behind at these points after the surrounding non-adherent parts of it had become detached. In most cases the whole thickness of the retina had been thus left behind, but in one spot there was every appearance of the inner layers having separated from the outer ones. The former thus took the general curve of the detachment, while the outer layers, being left behind, became stretched, and formed a small cylinder, whose outer end was adherent to the patch of diseased choroid, while its inner end

became continuous with the surrounding retina. The patch of choroid to which the outer end of this hollow portion of retina was attached was about $\frac{1}{20}$ in. (1·2 m.m.) across, and showed some deficiency of epithelial colouring. There were also on the outer surface of the retina three patches or spots as large as small lentils; their outer surfaces were slightly convex. These patches were more transparent than the rest of the retina, but were marked off from it by a narrow border of white opaque tissue. They looked just like small flattened cysts. In minute structure, one of them, which was examined, resembled the two specimens above described in all respects. They could scarcely be called cysts or vesicles, since their cavities were crossed by a number of supporting columns stretched between their inner and outer walls.

In this case it seemed probable that the cyst-like prominences on the outer surface of the retina represented a later stage of the hollow cylinder formed by the outer retinal layers which had remained attached to the choroid, and which was described above. On this supposition the following processes occurred before the formation of these little cyst-like patches:—1st, adhesion of the outer surface of the retina to a small patch of choroid by inflammatory effusion; 2nd, detachment and more or less shrinking of the retina surrounding the adherent patch; 3rd, a separation of the inner from the outer layers of the adherent part of the retina, with overgrowth of Müller's fibres; 4th, owing to the continued retraction of the surrounding detached retina, the part which by its outer layers remained adherent to the choroid, became at last separated from that structure, and formed the outer wall of the cyst-like patch on the retina.

The *iris* of this eye was adherent by its pupillary edge to the lens capsule, its peripheral parts being bulged forwards by distension of the posterior chamber, and being thus in contact with the cornea. The anterior chamber was thus obliterated at its circumference, but of fair depth in the centre. The *anterior chamber* contained opaque, whitish, tough material, which adhered to the centre of the cornea and to the front of the iris. This material consisted of a very regular arrangement of fine, smooth, highly refracting, somewhat brittle fibres, interspersed with a good many large round inflammatory cells. The *vitreous* was, of course, small in quantity. It was fluid, and con-

tained numerous tough webs, stretching from side to side. The *optic disc* was cupped, but the form of the cup was altered somewhat by the detachment of the retina.

In whatever manner these peculiar changes are brought about in the retina, whether by a morbid process starting in that structure, or as the result of changes in the choroid and sclerotic, the term œdema seems to me inadequate. The features which above all others strike attention are the elongation and thickening of the bundles of Müller's fibres, and the atrophy of the nerve cells and fibres. "Cystic disease" is less misleading, although the meaning commonly attached to the word does not bring to mind the appearances observed in any, excepting the most highly developed, specimens of the disease under consideration. It is, however, not easy to find any one word which will fairly express the essential conditions of this morbid state, and for the present, therefore, it will probably be better not to disturb the received nomenclature by suggesting any other name.

Fig. I

Fig. II

Fig. III

Fig. IV

DESCRIPTION OF PLATE IV.

Fig. 1. Vertical section of retina in an early stage of the condition described as "Œdema." From the *second* specimen described above. It shows the formation of cavities in the inner and outer granule layers separated by the inter-granule layer. There are also some small elongated cavities in the nerve-fibre layer, apparently formed by separation of its fibres and parallel with their long axes. A few round cells, somewhat larger than the granules and situated between the nerve-fibre layer and one of the large cavities, may be somewhat atrophied nerve-cells; no other nerve-cells are visible. × 260.

Fig. 2. Vertical section of retina in a much more advanced state of the disease. The rods and cones have disappeared. *a*. Internal limiting membrane. *b*. External limiting membrane. A single series of large cavities now exists between the two boundaries of the retina, the inter-granule layer having disappeared. The granules of the inner granule layer are much diminished in number. Those of the outer granule layer are somewhat fewer than in the normal state, and probably also spread through a wider space; mixed with them are numerous brown pigment masses from the choroidal epithelium. Between the two limiting membranes stretch the elongated fibres of Müller; their very great increase, *both in length and thickness*, of these bundles will be noticed. From the *first* specimen above described (Ophth. Hosp. Rep., vol. vii, p. 204). × 55.

Fig. 3 shows the manner in which the pillars of overgrown Müllerian fibres terminate in, and form the inner limiting membrane by breaking up into a mesh-work of branching and interlacing fine fibres. Oval nuclei (some of which are represented rather too large) are seen in connection with some of the fibres. From the specimen which furnished Fig. 2. This figure is amplified to the same extent as Fig. 1. × 260.

Fig. 4. Section through sclerotic choroid and retina, from a specimen in which well-marked "œdema" of the retina occurred at the seat of slight equatorial staphyloma. From the eye which furnished Fig. 1. *a*. Sclerotic. *b*. Choroid (left unshaded by an error in engraving). *c*. Retina with large cavities in the granule layers. The staphylomatous *thinning of the two outer tunics, with increased thickness of the retina*, well seen. × 15.

CURATOR'S PATHOLOGICAL REPORT.

By Edward Nettleship, F.R.C.S.,

Curator of the Royal London Ophthalmic Hospital Museum.

The present Report contains an account of the most important and interesting eyes removed in the hospital between July 1st and December 1st, 1871. The arrangement is nearly the same as in the last Report. Specimens marked * have been preserved in the Museum. The numbers refer to the Museum register of specimens.

Eyes lost by Injury.

The first four of the specimens described below illustrate the effects of recent wounds involving all the coats of the eye.

The two next (Nos. 91 and 82) are good examples of cyclitis with consecutive inflammation of vitreous, &c., coming on without any apparent immediate cause in eyes which had been contused a long time before.

Nos. 93 and 49 need no comment.

The last specimen, No. 87, resembles many of the eyes lost by purulent ophthalmia, in showing pigmentation of the retina following choroiditis.

58. *Small Puncture through all the Tunics with a clean Awl five days before Excision—Suppuration of Vitreous—Commencing Suppurative Inflammation of Retina and Choroid.*

Henry S., a boy, æt. about 12, under the care of Mr. Hutchinson. Five days before excision he ran a clean shoemaker's awl into his right eye; no part of the instrument remained in the globe. On the day of excision there was much congestion, and moderate pain. T−. He said he could still just see light with this eye. A wound was found at the inner part of the sclero-corneal junction; it was filled with lymph and prolapsed iris, and a mass of yellow lymph passed from the inner aspect of the wound to-

wards, and apparently into, the lens. The iris was discoloured and vascular. The aqueous was dull, and the cornea slightly hazy.

The globe was put into Müller's solution for six weeks, and then bisected in the antero-posterior direction.

The *vitreous* was gelatinous and semi-transparent, but contained many large masses of pure pus, many of which were connected with the hyaloid. The semi-transparent parts were quite structureless, and contained no cells of any kind.

The *retina* at the optic disc, and for a considerable distance around it, was somewhat thickened. It was slighly detached in a few places from the choroid, and these detachments generally occurred at spots where the retina was in contact with a thick mass of pus in the vitreous. In vertical sections made near the optic disc, numerous pus-like corpuscles were found in the nerve fibre layer. The rods and cones in these sections were well preserved, but the granule layers and nerve-cells were by no means well-defined, and the vertical connective-tissue pillars were obscure. These appearances might have been produced by general swelling of all the elements, or by the effusion of a coagulable liquid between the retinal elements. In specimens taken from near the ora serrata numerous pus cells were also found.

The *choroid* was examined at the equator of the eye, and there found to be full of pus-corpuscles. They were present both in the chorio-capillaris and in the deeper layers. In some parts the hexagonal epithelial cells were normal, in others they were irregular in shape; there was no conclusive evidence of proliferation in them. The anterior chamber was rather deep, and was filled with semi-opaque, soft, rather tough material, which consisted of fine, sharply defined fibres, for the most part nearly straight, and running in every direction. Among these fibres were a few large corpuscles of considerably greater diameter than white-blood corpuscles. The lens appeared normal in size and position; it was not examined microscopically.

61A. *Rupture of Eye—Excision eight days later—Commencing Neuritis.*

John M., æt. 35, under the care of Mr. Hulke. Eight days before excision his left eye was kicked by another man. He stated that the eye "closed up" after the blow, but that it had

not been very painful. At the time of excision the cornea was universally opaque and yellowish, and there was a large hole in its upper part, apparently from sloughing. The conjunctiva was much chemosed, and at the upper part formed a large swelling, which overlapped that part of the cornea. This swelling was produced chiefly by the lens which escaped from beneath the conjunctiva during the operation, and was found to have left the globe by a large rent in the sclerotic near the insertion of the superior rectus. The lens was still within its capsule, and was quite transparent. Most of the vitreous escaped during excision; it contained many blood-clots.

The *retina* was everywhere *in situ*. There were several patches of hæmorrhage in its substance at the fundus, and one especially well-marked at the region of the yellow spot. The veins were dilated and somewhat tortuous. The greater part of the retina was perfectly transparent, but in the neighbourhood of the disc it was beginning to become opaque and white. The opacity chiefly followed the course of the vessels, one of which was slightly obscured. This change involved the margin of the disc, which was thus rendered slightly "woolly."

Some sections of the *retina* and *hyaloid* were made after the specimen had been placed for six months in Müller's solution. In the nerve-fibres of the optic disc there were a large number of pus-like corpuscles, and they were most abundant in, if not confined to, the immediate neighbourhood of the large blood-vessels. No inflammatory corpuscles were found in any sections of retina. In all the sections of retina which were examined the layer of rods and cones, of nerve-fibres and nerve-cells, looked healthy. The granule and molecular layers did not show well; their elements were ill-defined, perhaps from serous infiltration.

The *hyaloid* on the disc, over the physiological cup, contained a large number of pus-like corpuscles of the same size and appearance as those in the subjacent nerve-fibre layer.

The *choroid* was examined only close to the optic disc; in that position its deep layer was remarkably opened up, so that spaces of considerable size existed between its stellate pigment cells. This condition might have been produced by œdema. The large vessels appeared of unusual dimensions, as if dilated, but they were almost empty; probably their blood had been accidentally washed out.

*56. *Perforating Wound in Ciliary Region by chip of Metal—Excision eleven days later—Foreign body in Vitreous—Vitreous containing Blood and Inflammatory Products—Slight Effusion between Retina and Choroid—Thickening and Distortion of Outer Layers of Retina, probably by Inflammatory Corpuscles.*

Henry K., æt. 21, under the care of Mr. Hutchinson. Eleven days before excision his left eye was wounded in the ciliary region by a piece of metal. It was doubtful whether the foreign body remained in the eye or not. Vision was at once reduced to perception of shadows, and a few days later was lost altogether. Great pain set in a few hours after the accident, but this symptom disappeared several days before the eye was removed.

Condition at date of excision:—"There is a wound in the ciliary region coming up to the corneal edge, and filled by lymph. Anterior chamber of good depth. Iris discoloured. Cornea transparent. Much congestion. T —. The other eye good."

The globe was hardened for twenty-four hours in chromic acid, and then divided (through the wound) into equal upper and lower halves.

The wound was filled by toughish gray-white fibrous tissue containing many oval nuclei and free round lymph corpuscles. The *lens* was transparent, of normal shape, and not displaced. Its *suspensory ligament* was infiltrated with coagulated albuminous fluid, in which were a few small (? inflammatory) cells. That part of the *vitreous chamber* close to the wound, and extending thence to the back of the lens, was occupied by material having a finely fibrous structure, and which was infiltrated to a varying degree by round nucleated pus-like cells, about as large as white blood-corpuscles. The fibres alluded to were short, straight, and finely beaded, and they crossed each other at various angles. The vitreous at the upper and back part was fluid; elsewhere it was somewhat too firm and mixed in many parts with large dark blood clots, while at the lower and back part it was suppurating freely, and was very adherent to the retina. In the midst of a large mass of blood at the lower part the chip of iron was found.

The *retina* was rendered opaque by the chromic acid. Its veins were distended with blood. In the lower part of the globe, passing from the disc downwards, and in contact with the sup-

purating part of the vitreous, were large patches of retina raised considerably above the general surface, apparently by thickening of the retinal substance. These patches were abruptly raised from the surrounding retina. In all other parts the retinal surface had its normal curve. Sections were made through one of these raised patches, and the neighbouring normal-looking retina. At the part which formed the projection the retina was somewhat thickened, and its outer layers (especially the outer granule layer) were much distorted, so that in vertical sections their outlines formed lines sharply curved inwards and outwards, instead of being parallel with the inner layers. This distortion began gradually in the inter-granule layer, and attained its maximum at the outer limiting membrane. The outer-granule layer in the distorted parts was thickened, and contained a very large number of granules or cell elements, so that in minute isolated portions of it several cells or granules were often seen forming vertical lines by the side of, and within, the fibres of Müller. These cell-elements were for the most part roundly oval and finely granular, but not a few were somewhat smaller, homogeneous, more highly refracting, and quite round. It was the latter which were noticed to be free among, and by the side of, the Müllerian fibres, while the granular, oval, larger ones were structurally connected with those fibres. Probably the round, highly refracting cells were results of inflammation. The rods and cones were not well preserved anywhere, being represented by a structureless layer of granular matter. In those parts where the outer granule layer was thickened and undulating, the altered rods and cones were mixed with numerous spherical, apparently structureless, or granular, masses, and with loose granular matter. These spherical masses were probably indicative of choroidal inflammation, and it is probable that some of the apparent thickening of the retina at the raised patches was due to subretinal effusion of which these masses formed part. The inter-granule layer was thickened, and in it the fibres of Müller were remarkably distinct, and appeared to be increased in transverse diameter. In the nerve-cell layer there were, besides the normal ganglion-cells, a large number of round, clear, highly refracting corpuscles without processes, much smaller than the nerve-cells. They were slightly larger than the granules of the inner granule layer, to which in other respects they bore a close resemblance. The

nerve-fibre layer did not show any well-marked evidence of inflammatory changes, though in a few parts there were doubtful appearances of lymph corpuscles amongst nerve-fibres. In the thinnest sections, and in isolated bundles of fibres, no undoubted inflammatory corpuscles could be made out. The hyaloid covering those portions of retina which were examined contained numerous elements of various sizes, from pus-like corpuscles to large nucleated cells.

The *choroid* was examined in sections only near to the foreign body, and even there not exhaustively. It appeared quite normal at that part.

101. *Wound two weeks before excision—Small bit of Iron in Vitreous—Lens wounded, and softened in centre—Suppurative Inflammation of Choroid, Vitreous, and Retina.*

William B., æt. 21, under the care of Mr. Couper. Two weeks before excision his right eye was wounded by a small piece of cold iron. A week after the accident he could still see shadows. Pain began to trouble him a few days before the globe was excised.

Condition at date of excision: "No definite scar can be seen. Perhaps a spot of unusually congested conjunctiva and sclerotic at the upper part may mark the entrance of the foreign body. Lens opaque. T +. No perception of light. The other eye has been nearly blind since childhood, from an injury by a pine-apple leaf."

The excised eye was placed for four days in chromic acid, and then divided in the antero-posterior direction into equal halves.

A very minute piece of iron, not larger than a small pin's-head, was found in the lower part of the vitreous a little to the outer side of the middle line. The *cornea* appeared to the naked eye to be normal. The *pupil* was blocked by a plug of yellowish lymph, which adhered both to the iris and the lens. The *lens* was transparent, except at its central parts. In its axis, passing from before backwards, were several streaks and patches of whitish opacity, and the whole of the central part, instead of being firm, was much softened, softer even than the peripheral portions. The opaque streaks referred to consisted of (*a*) ill-formed lens-fibres; (*b*) spherical and irregularly shaped globules of oil or

myeline, few in number; (*c*) very numerous small spherical highly refracting corpuscles, about as large as red blood-corpuscles; (*d*) large corpuscles of finely and faintly granular appearance, somewhat widely spread and never crowded together. The *vitreous* near to the back of the lens consisted entirely of well-formed pus-cells. The hyaloid was everywhere suppurating freely, and close to the optic disc it formed a thick pad of pus. The central part of the vitreous was still clear. The *retina* was everywhere in contact with the choroid. It adhered strongly to the hyaloid, and could very readily be separated from the choroid, the hexagonal cells of which adhered in great numbers to its outer surface. In the neighbourhood of the disc it was very soft, enormously thickened, and consisted almost entirely of pus corpuscles. The *choroid* was thickened everywhere, but more so at the back of the eye than elsewhere. Vertical sections showed that the thickening was due to purulent infiltration of the chorio-capillaries, which layer indeed consisted of little else but pus-cells. The epithelium, where present (for much had become detached with the retina), and the elastic lamina appeared normal. The deep layer of the choroid seemed to be, in the sections examined, quite free from inflammatory products.

91. *Suppurative Cyclitis and Inflammation of Vitreous; Retina near Optic Disc containing lymph corpuscles—Blow on Eye eighteen months before excision; sight damaged—Spontaneous acute Inflammation three weeks before excision.*

William W., æt. 52, under the care of Mr. Soelberg Wells. Eighteen months before the excision his *left eye* was struck by the handle of a barrow. Sight was much damaged, and was never after the accident good enough to enable him to read with this eye; but it was not entirely lost until three weeks before excision. He had an attack of pain and intolerance of light several months before he came under care. Three weeks before the eye was removed it suddenly became painful and inflamed, and all remaining sight was lost. The pain continued until the globe was excised. It was removed on September 19, and placed in a weak solution of chromic acid until November 3.

The *cornea* was ulcerated deeply between the margin and the centre, and at one spot perforation had occurred and slight pro-

lapse of iris had taken place. A vertical antero-posterior section was made through the eyeball. The *lens* appeared healthy to the naked eye, but had fallen forwards from the loss of the aqueous.

The *vitreous* was everywhere semi-opaque, and at one part contained a large collection of recent pus composed of well-formed corpuscles. The hyaloid everywhere contained proliferating cells, and capsules in which several new cells were enclosed. Webs containing these cells likewise passed in all directions through the vitreous. The changes in the hyaloid were most advanced in a patch about half an inch (13 mm.) long which lay over the ora serrata. In this part the hyaloid was much thickened and quite yellow with purulent infiltration, and more adherent than usual to the ora serrata. It is probable that the suppuration started from this area into the vitreous.

Sections through the *ciliary body* and *retina in front of the ora serrata* showed both these parts enormously swollen from infiltration with pus-cells. The same condition was present in that part of the *choroid* immediately behind the ora serrata, but in a less marked degree; while sections of the choroid near the disc showed nothing abnormal, except a somewhat granular appearance. Even in the parts of the choroid and ciliary body where the inflammatory changes had gone furthest, all the layers of the uveal tunic could easily be made out.

The *retina* in the neighbourhood of the optic disc was somewhat thickened, in other parts it appeared of normal thickness, excepting as above stated, in front of the ora serrata. Vertical sections through the retina close to the disc, and through the disc itself showed the nerve-fibre layer abundantly infiltrated with inflammatory corpuscles, having the size and appearance of pus corpuscles. A few of them perhaps existed in the layer of nerve-cells, but none in any of the deeper retinal structures. These products of inflammation were far most abundant on and close to the optic disc, but did not pass downwards so far as the lamina cribrosa. They rapidly diminished in number away from the disc, and were comparatively scarce at ·125 inch (3·12 mm.) from its edge. No sections were examined further from the disc than ·125 inch (3·12 mm.).

The layer of rods and cones was represented, in the sections examined, by a structureless layer of granular matter. In one spot, close to the disc, this layer became suddenly much thick-

ened, and the whole thickness of the retina was raised up over the little hillock thus produced. This granular layer was most likely in part the result of effusion from the choroid which occurred unequally in different parts. The other layers of the retina near the disc were normal, and the fibres of Müller were well preserved and unaltered.

*82. *Acute Irido-cyclitis, with great inflammatory thickening of part of Ciliary Body, &c.—Inflammation of Vitreous, and commencing Suppurative Neuro-retinitis—Bulging in Ciliary region from partial rupture of Sclero-corneal junction by pressure of inflammed tissues within—Blow on the Eye twelve months before.*

Walter B., a healthy looking boy of 11 years, under the care of Mr. Hutchinson. About five weeks before excision his right eye became "blood-shot;" it was well when he went to bed over night, but was red and inflamed the next morning when he woke. The congestion persisted. The sight did not begin to fail till five days later, and in a few days the eye was blind. He had no severe pain at any time. On admission, September 4, 1871, the following note was made:—"Right eye quite blind. T −. Large vessels of conjunctiva dilated and tortuous. Anterior chamber half full of dark blood, on which (or more probably on the posterior elastic lamina of the cornea) are a number of opaque white dots, somewhat larger than those usually seen in keratitis punctata. The iris is inflamed and the pupil very irregular. The ciliary region is everywhere bulging, but this is most marked at the upper and inner part where the sclerotic is quite thin and the pigment begins to show through it.* There are several whitish spots in the conjunctiva covering the ciliary swelling; perhaps they are enlarged glands."

No satisfactory cause for the loss of the eye could be ascertained. The only facts bearing at all upon it were as follows:—(1st) Twelve months before the attack he received a blow from a fist on the eye; it resulted in an ordinary "black eye," but no special notice was taken of the occurrence, and the boy believed the sight was not in any way injured. (2nd) His mother

* The dusky colour, supposed to be due to ciliary pigment, was probably caused chiefly by the distended blood-vessels of the ciliary swelling. As will be presently seen, the pigment of this part had become scattered throughout the inflammatory tissue.

stated that six weeks before excision, and one week before the eye began to inflame, the patient had carried a heavy bundle of clothes on his head for a quarter of a mile to his employers. The "bundle was as much as he could stand under." When he came home after carrying the bundle his head and neck were bent over to the right side, and he could not move his head from side to side from stiffness. He complained of pain in his neck for several days afterwards, and a week after the occurrence his eye inflamed. It must be confessed that neither the blow on the eye a year before the destructive inflammation set in, nor the sprain of the neck from carrying a heavy weight on the head, can be called a satisfactory cause of the irido-cyclitis which followed them. No other cause could be found. There were no evidences of inherited or acquired syphilis. He had never had rheumatic fever, nor any infectious disease, excepting measles. He had not been subject to epistaxis.

The globe immediately after excision was put for a week into chromic acid, and then divided vertically in the antero-posterior direction through the optic nerve and cornea.

The *cornea* in thin sections showed abundant, but patchy, infiltration of its deeper layers, near its margin, with round pus-like corpuscles. Elsewhere it appeared normal. No deposits could be identified on its posterior surface apart from the mass of coagulated blood.

The lens was perfectly transparent, and appeared in all respects quite healthy. The ciliary region was the seat of the most marked changes. Over rather more than half the circumference of the globe, chiefly at its upper part, all the tunics were very much thickened in the ciliary region, and the swelling noticed during life was formed by the most thickened part of the sclerotic and ciliary body. The ciliary body was covered on its inner surface by a layer of soft white tissue, which was continuous with the vitreous humour. The *vitreous* itself contained many opaque threads and bands near to the diseased portion of the ciliary body, and these opacities were found to be due to the presence in the vitreous of numerous large round nucleated cells, and branching connective-tissue corpuscles. Elsewhere the vitreous looked healthy to the naked eye. Thin sections were made through the ciliary swelling so as to include all the tunics. From the outer surface of the sclerotic to the inner surface of the

suspensory ligament measured somewhat more than ·1 inch (2·5 mm.) at the thickest part. When magnified 30 diameters, the following conditions were noticed :—The *suspensory ligament* was much thickened, forming the layer of soft white tissue above noticed on the inner surface of the ciliary body. The ciliary body itself, including the ciliary muscle, was also greatly thickened; while its most anterior part, the ciliary process, was represented by a mass of colourless inflammatory material, in the midst of which the outline of the ciliary process could just be traced as a somewhat irregular pigmented line, which became continuous in front with the iris. The inner layers of the sclero-corneal junction had become ruptured by the pressure from within, and were widely separated from one another by the inflammatory mass which occupied the position of the ciliary process, and bulged outwards as well as inwards. The outer layers of the sclero-corneal junction, however, had yielded gradually to the pressure and had not ruptured. The inner (ruptured) layers of cornea and sclerotic were quite clear and healthy looking, whereas the outer layers were much thickened and rendered opaque for some little distance on each side the sclero-corneal junction by inflammatory deposit. The ciliary process, which, as has been stated, could be traced as a line of pigment, had become invaginated into the aperture formed by the partial rupture of cornea and sclerotic, and it was almost in contact with the concave inner surface of the bulging outer sclero-corneal layers. Thus in all probability the greater part of the inflammatory material derived from the ciliary process itself had collected on its *inner* surface, forming the thick mass which has been mentioned as projecting inwards. The ciliary process thus became pushed outwards through the aperture in the deep layers of the sclero-corneal junction; the superficial layers of the outer tunic, being softened by inflammatory infiltration, yielded gradually. The peripheral part of the iris was implicated in the inflammatory process, being enormously thickened and continuous with the mass which occupied the position of the ciliary process. The above changes were found, on examination with higher magnifying powers, to be due to the infiltration of all the tissues with lymph or pus cells. In the ciliary process they were so numerous as quite to have destroyed all its characters excepting the pigment cells. In the outer layers of the sclerotic and cornea

near the sclero-corneal junction, the normal fibrous bundles were widely separated by closely-packed masses of the same inflammatory corpuscles. There were, however, none whatever in the inner (ruptured) layers, which were on the contrary quite healthy, and were separated by a tolerably definite line from the inflamed layers. The subconjunctival connective tissue was also quite free from inflammatory cells. In the ciliary muscle and iris the corpuscles were also crowded thickly together so as greatly to obscure the normal structures. In the ciliary retina and suspensory ligament they were much less numerous, though still present in very large numbers; and on the inner surface of the suspensory ligament was the hyaloid, containing the elements already described in the anterior part of the vitreous. The *retina* was everywhere in contact with the choroid. It was nearly opaque from the action of chromic acid. Its inner surface was sprinkled with a number of small white elevated dots, apparently swellings of its substance, and it was thickened at and around the optic disc. Several sections were examined from the neighbourhood of the disc, and one section taken through the disc itself. On the disc, and in the retina close to it, the nerve-fibre layer was infiltrated with numerous round lymph-corpuscles, having the size and characters of white blood-corpuscles. These were most plentiful in the sheaths of the large vessels on the disc, but they were also scattered about in considerable numbers at a distance from blood vessels. I could find none of these inflammatory cells in any sections of retina excepting close to the disc. The layer of rods and cones was somewhat imperfect, and its elements were rather ill-defined, but these appearances were very likely in part accidental or due to chromic acid. None of the other layers showed anything amiss. I did not recognize any elevations of surface corresponding to the white dots noticed with the naked eye, and it is probable that none of them were included in the sections examined. The *choroid* was examined close to the disc, and appeared, when highly magnified, to be normal, excepting that its epithelial cells were ill-defined and had lost their outlines somewhat. No prolonged examination of the choroid in other parts was made, but vertical sections from various regions examined cursorily appeared healthy.

*93. *An unusually large foreign body (glass) retained in the Eye for six weeks—No suppuration.*

Sarah S., æt. 18, under the care of Mr. Couper. Six weeks before excision her left eye was wounded during an explosion of gun-cotton. At the date of excision the *left eye* was shrunken, red, painful, and quite blind. There was a large scar in the cornea, but the rest of the cornea was clear. The right eye was irritable.

After excision a large hard body could be felt within the globe. A scar $\frac{1}{3}$ inch (8·15 mm.) long was found extending vertically through the upper part of the cornea and sclerotic. When the eye was opened a large piece of glass was found inside it. The piece of glass was triangular in shape, about 1 inch (25·3 mm.) in vertical length, ·5 inch (12·5 mm.) wide at its base, and ·083 inch (2·1 mm.) thick. The base of the triangle nearly corresponded with the scar of the wound; the apex was sharp, and was firmly fixed against the opposite side of the globe close to the insertion of the inferior oblique. It had perforated the retina and choroid, and rested against the inner surface of the sclerotic. The *vitreous chamber* contained, besides the glass, bloody fluid and flocculent bits of greyish material. The hyaloid was in some parts detached from the retina. The *retina* was semi-transparent and detached in folds. The subretinal space contained flocculent greyish material, probably altered blood-clot. There was no subchoroidal hæmorrhage. The lens was absent.

*49. *Concentric shrinking and thickening of all the Tunics of an Eye which was severely wounded eleven years before excision—Chronic Sympathetic Ophthalmitis of the other Eye.*

This specimen is a good example of considerable and equal shrinking of all the coats of the eye, without any relative displacement, except slight folding of the retina.

Thomas J., æt. 16, under the care of Mr. Wordsworth.

Eleven years before excision his right eye was wounded by glass; sight was lost either immediately, or after a short interval, but he stated that he had neither pain nor other inconvenience after the first effects of the accident had passed off. About twelve months before he came under care, the other (left) eye began to fail, and it continued gradually to get worse.

At the date of excision, the right eye was much shrunken, and there was a large transverse scar on the cornea. It was not painful. The left eye showed slight ciliary congestion; the pupil was fixed and rather large; there was considerable irregularity of the corneal epithelium opposite to the palpebral fissure, forming a band of little eminences across the cornea in that situation. V. 18 J. This eye improved somewhat after excision of the right.

The right eye, after excision, was placed for a few days in chromic acid, and then bisected in the vertical direction from before backwards.

The *iris* was adherent to the greater part of the corneal scar, by means of connective tissue containing oval nuclei and round inflammatory corpuscles.

The *cornea*, examined in vertical sections with the microscope, was normal except at the scar. At that part the epithelium on the anterior surface abruptly ceased; while on the hinder surface the posterior elastic lamina at the corresponding part showed a rupture of continuity, on each side of which it was puckered. Through the aperture the iris was adherent to the tissue of the cornea proper. There were vessels in the cornea at the scar. Near the anterior surface of the scar calcareous masses were imbedded in the corneal tissue.

The *lens* was shrivelled, flat, and of stony hardness, and quite opaque. The posterior layer of the lens-capsule was not adherent to the lens, but the anterior layer could not be identified. There was considerable thickening about the region of the *ciliary muscle*.

The *retina* was shrunken, thickened, and slightly detached in folds from the choroid; it was semi-opaque. When magnified it was found to consist solely of retinal granules, and elongated, but thin, connective-tissue bundles. The *choroid* was much thickened. Its epithelium was absent almost everywhere. The thickening had occurred chiefly in the chorio-capillaris, and the production of inflammatory products had there been accompanied by the formation of numerous large spaces (resembling dilated thin-walled blood-vessels) in the choroidal tissue. The *sclerotic* was greatly increased in thickness, especially at the back of the eye.

*87. *Chronic Cyclitis and (probably) Choroiditis, with extreme (secondary) Retinitis Pigmentosa, in an Eye lost by a perforating wound of the Cornea forty years before excision—The Eye slightly shrunken—Lens partly absorbed.*

Emily L., æt. 42, under the care of Mr. Hulke. At the age of twelve months her left eye was wounded by a pair of scissors; she believes that the scissors perforated the coats of the eye. It was occasionally painful until about the age of seven years, after which time it remained quite quiet until six weeks before excision, when it became painful and inflamed. The right eye became irritable for a few days before the operation.

At the date of excision the left eye was slightly shrunken, its cornea was opaque, and contained calcareous matter, and there was a doubtful appearance of a scar at the upper part. After removal it was placed in chromic acid for a week, and then opened by an antero-posterior vertical section.

The *iris* was in contact with the cornea, and strongly adhered to its upper part, confirming the suspicion formed before removal as to the seat of the former wound.

The *lens* was represented by an opaque yellow nucleus situated near the seat of the scar. The lens capsule, suspensory ligament, and neighbouring hyaloid, were very much thickened over the inner $\frac{2}{3}$ of the circumference of the eye. At a part a little behind where the margin of the lens should have been, where also this fibrous thickening was greatest, there was a narrow band of bone developed in the fibrous tissue; it formed part of a circle parallel with the ora serrata.

The *retina* was semi-opaque when the eye was opened (probably this was from the action of chromic acid), and everywhere in contact with the choroid. It was very highly and very curiously pigmented. The pigment occupied a zone about ·3 inch (7·5 mm.) wide at the equator of the globe, the hinder border of the zone being rather abrupt, while its front part passed more gradually into the unpigmented peripheral retina. Examined with the naked eye the pigment was found to consist of islands and spots of various sizes, and often separated from one another by wide branching bands of unpigmented retina. When magnified forty diameters, the dark islands were seen to be formed by densely black roundish spots, intermixed with many lines

and branching figures of pigment, while on the outskirts of the pigmented zone were numerous small round dots of black, which had not yet become large or numerous enough to coalesce and form islands of considerable size. Narrow pigmented lines were seen in the middle of, and following the course of, some of the wide bands of unpigmented retina which separated the large dark islands from each other. These narrow lines evidently accompanied large retinal vessels, and it will thus be seen that, in some cases at least, the larger retinal vessels, although themselves bordered by pigment, were separated by bands of unpigmented retina several times their own width, from the large insular collections which formed so marked a feature in this specimen. The region of the yellow spot was occupied by a patch of coal-black pigment, quite abruptly defined, and separated by a wide tract of unpigmented retina from any other similarly diseased part. Examined under a power of forty diameters in vertical section, the greater part of the pigment was found to be in the inner layers of the retina. In some parts, however, the outer retinal layers contained pigment, and when this was the case the colouring matter was often noticed to be continuous with the epithelial pigment of the choroid, which in such parts (as well as in some other places) was disturbed. No more minute examination was made of either retina or choroid.

Eyes lost by Purulent Ophthalmia.

Nos. 74 and 113 illustrate very well that form of retinitis pigmentosa which is commonly found in eyes lost during infancy from perforating ulceration of the cornea and excised many years later. Such eyes are generally (putting aside the corneal irregularity or bulging) of good shape and normal size.

The lens is commonly absent, or, if it did not escape through the hole in the cornea, is much shrunken. The vitreous is fluid. The retina and choroid show evidences of atrophy following inflammation, and in the retina, at the equator, is a quantity of pigment distributed chiefly along the blood-vessels.

74. *Perforation of Cornea and loss of Lens during Purulent Ophthalmia in Infancy—Excision nineteen years later—Old Choroiditis and Secondary Retinitis Pigmentosa.*

Annie R., æt. 19, under the care of Mr. Hutchinson. Her left eye was lost by purulent ophthalmia in infancy. She applied at the hospital because the eyeball had become tender when touched.

Condition at date of Excision.—Left cornea opaque and uniformly staphylomatous. The eyeball is very tender but not congested. The right eye is good, with the exception of a nebula on the cornea.

The eye was divided transversely a few days afterwards. There was no trace of a lens. The *iris* was thin, and torn into irregular shreds, which for the most part adhered to the cornea. The *choroid* showed abundant evidence of past inflammation, its epithelial pigment-cells being much disturbed. These cells were heaped up into dots or patches in some parts, while there were many other spots from which the epithelium was absent. There was one especially large patch of heaped up pigment at the equator, and to this patch the retina adhered firmly. The *retina* was everywhere in contact with the choroid. Near to the equator it showed a few dots and streaks of pigmentation, the streaks in all probability following the course of retinal vessels. On examining the relation between the pigment in the retina and the patches of disease in the choroid, no uniform correspondence could be found between them; sometimes a line or patch of pigmented retina lay over a patch of old choroiditis, while at others the subjacent choroid was apparently healthy. No microscopical examination of the structures of this eye was made. It is preserved in the Museum of the London Hospital Medical College.

113. *Choroiditis, with Secondary Retinitis Pigmentosa, and formation of Bone in Retina—Vitreous Fluid—Lens absent—Eye lost by Corneal Inflammation and Perforation nineteen years before excision.*

Mary B., æt. 19, under the care of Mr. Hulke. Her right eye was lost by some "inflammation" when she was a few months old; she believed that the disease was not the result of any injury. She stated that the eye had never been inflamed since

she could remember, but that it had ached occasionally when she had overworked the other eye.

Condition at date of Excision.—The right eye had no perception of light. Its cornea was densely opaque and white. The left eye was good, and there were no opacities on the cornea. It was not, nor had it been, painful.

The right globe after excision was, by accident, left in water for nearly two days, it was then put into absolute alcohol for twelve days, and at the end of that time divided transversely.

The *lens* was absent. The *iris* was frayed out on the back of the cornea, and adherent to it.

The *vitreous* was represented by a watery fluid containing a curdy white precipitate (coagulated albumen). There were no traces of fibrous webs in the vitreous chamber.

The *choroid* was, in most of the many sections examined, thin from atrophy of its stroma. Its epithelium was absent in many parts.

The *retina* was *in situ* everywhere. It was very highly pigmented in all parts excepting near the disc. The pigment (seen under a magnifying power of 30 diameters) very clearly followed the course of the retinal vessels, both large vessels and capillaries. Vertical sections examined under a magnifying power of 250 diameters showed that the retina was much wasted at the pigmented parts. In parts where there was no pigment the various layers of the retina could be made out, excepting the bacillary layer which could not anywhere be traced. The retinal pigment was generally situated in the inner layers, but in not a few places it was found in the outer granule layer, and in some sections it could be seen in all parts between the external and internal limiting membranes. The choroidal epithelium was generally absent beneath and near to the pigmented parts of the retina, but might sometimes be seen slightly separated from the elastic lamina, and apparently passing into the subjacent retina.

At one part of the pigmented portion of retina was a long, narrow patch of bone. It was thin, irregular in outline, and projected on the inner surface of the retina. It was about ·2 of an inch long (5 mm.), and about half that width. From its borders spurs or processes of bone passed out into the retina around. A large retinal vessel, containing blood, passed through its middle, and was imbedded in it. Well formed lacunæ and

canaliculi were present in abundance. The retinal capillaries in the neighbourhood of this bony patch were in most cases in an advanced state of fatty degeneration, and formed a network of oil globules. The bone was irregularly mixed up with patches and lines of pigmented unossified retina, especially at and near its margins.

Eyes lost by Syphilis.

Nos. 76 and 78 were obtained from patients in the secondary stage of syphilis, the former about eight months, the latter one and a-half years after the primary disease. No. 76 illustrates the active stage of secondary syphilitic inflammation of the uveal tract, retina, and vitreous; while in No. 78 we see the results left by a somewhat similar state of things, atrophy having followed a state of acute inflammation.

*76. *Syphilitic Iritis, followed in one Eye by Plastic Cyclitis, Inflammation of Vitreous, Choroiditis with Subretinal Effusion, and Retinitis—Large Growth of Organised Lymph from Ciliary body—Excision about eight months after commencement of Iritis.*

Mary Anne M., æt. 25, unmarried. Under the care of Mr. Critchett. About Christmas-time, 1870, she had severe secondary syphilis, bubos (non-suppurating) in each groin, double iritis, ulcerated throat, rash on the skin, and glandular enlargements at the back of the neck. She was under care at another hospital, and was salivated as she asserts until two or three weeks before she came under Mr. Critchett's care. Her left eye got well; the right improved for a time, but became worse again about three months before admission; it was extremely painful throughout the whole attack. On admission at the end of July, she had very severe iritis in the right eye, and synechiæ, but no inflammation in the left. Mercurial inunction was ordered. A fortnight later the following note was made:—"Has been slightly salivated for several days. Is cachectic and feeble. There are maculæ (the remains of the syphilitic rash) on her face. Cervical glands enlarged; throat not now ulcerated.

Left Eye well, excepting posterior synechiæ. *Right Eye* very painful and quite lost. T—. Great congestion, both conjunctival and scleral. Cornea steamy. Iris pushed forwards; no anterior chamber. The lower and outer part of the ciliary region is occupied by a large bulging mass, resembling a ciliary staphyloma in form, but of brownish grey colour, instead of bluish. It involves the edge of the cornea, and appears to drag the iris somewhat downwards." The eye was excised the same day, August 15. The tumour gave way at its apex when the globe was accidentally dropped, but none of the contents of the globe escaped from the small aperture thus formed. The eye was hardened for 24 hours in chromic acid, and then divided into unequal halves in the antero-posterior direction, the section passing through the tumour and leaving the optic nerve entire in the lower and outer half.

The *iris* was covered on its anterior surface by a layer of tough pale material consisting of large nucleated inflammatory cells imbedded in a granular and indistinctly fibrous basis. The pupil was closed. The *lens* was transparent. The *tumour in the ciliary region* had, in section, a light greyish-pink colour, interspersed with many blood spots (divided vessels). It was of tolerably firm consistence. The intra-ocular portion of the growth formed a thick layer on the outer and inner surfaces of the ciliary body, from the ora serrata to the ciliary processes, and it involved also the peripheral part of the iris on its front surface. At the sclero-corneal junction the growth from the ciliary body appeared to have burst through the coats of the eyeball, and thus to have grown outwards and formed the extra-ocular protrusion seen during life. This extra-ocular part had spread backwards between the sclerotic and conjunctiva, and gradually tailed off a little behind the equator. That part of the growth which involved the ciliary body consisted of large round corpuscles with slightly granular contents, and some of them containing pigment. They were all much larger than pus corpuscles. The part situated on the outer surface of the sclerotic consisted of corpuscles having just the size of pus cells. They were crowded together between the conjunctiva and sclerotic, and the superficial bundles of the latter were separated by larger and smaller groups of the cells, but none passed for any considerable distance into it. In all probability the cells of the *ciliary* growth

were derived from the pigmented epithelial layers of the ciliary body. The growth contained a great many large thin-walled vessels which were full of blood. The *vitreous* was much altered. The part in contact with the ciliary growth had become converted into a tough, stringy, whitish tissue, which adhered very firmly to the ora serrata, and less so to the inner surface of the ciliary growth and the back of the lens-capsule. Passing backwards from this focus of disease the vitreous became less and less opaque and stringy, but was nowhere clear. At the lower and back part of the eye a considerable part of the vitreous was quite fluid. The opaque strings and webs consisted of corpuscles for the most part somewhat larger than pus corpuscles, imbedded in a finely fibrous and minutely granular matrix. The hyaloid was much thickened, and showed the same structure in all essentials as the opaque webs passing through the vitreous; some of its cells contained several nuclei, and in some parts the corpuscles were collected into groups or nests, though no brood-capsules were seen. The tough and much altered vitreous, above described as in contact with the ciliary growth, was composed of the same round corpuscles, but they were mingled with a large number of others in various stages of elongation towards fibres; so that this part of the vitreous would probably have developed into fibrous tissue and not passed into pus.

Between the retina and the choroid there was a widely-spread layer of effusion. In most parts it was so thin as not perceptibly to alter the retinal curve, but near the upper and inner part of the equator (on the side opposite to the ciliary growth) some large patches of retina were quite raised up from the choroid by the effusion, looking as if they had been blistered. The subretinal effusion was present as a firm white layer around the optic disc, as well as over the greater part of the upper and lateral portions of the choroid, but it was quite absent from a large part of the lower half of the eye, the choroidal surface in that part being quite clean. It consisted of 1st, round cells, most of which were large and contained a nucleus of considerable size, and some of which were coloured of a brownish-yellow tint; 2nd, a comparatively small number of lymph-like corpuscles, about as large as white blood-cells; 3rd, much granular matter. The large coloured cells looked as if they were altered epithelial cells from the choroid. *The choroid.*—

The epithelium was complete in many sections, but in others it was wanting over spaces corresponding to several cells; the individual cells were ill defined and dim, as if from the presence between them of some granular matter. The inner surface of this layer was covered by the granular matrix of the subretinal effusion. The elastic lamina was normal. The chorio-capillaris was very unusually dim and granular from the presence apparently of fine molecules in its substance.

The *retina* was thickened in all parts, more or less, but especially so in the neighbourhood of the disc, and generally where the subretinal effusion was most abundant. The presence of several patches of detachment has already been noticed. The region of the yellow spot was markedly thickened, though less so than some other parts. A thin section including the optic disc and neighbouring retina was examined first entire, and then after parts of the nerve-fibre layer had been teased out. A considerable number of round, slightly granular corpuscles were found among the nerve-fibres; they were about as large as pus-corpuscles; they were quite free, as could often be proved where the nerve-fibres had been separated and had left these corpuscles in their interstices. The cells referred to were scattered, and were chiefly if not entirely confined to the inner strata of the nerve-fibres (nearest the vitreous). There were also rather large oval swellings noticed on some of the nerve-fibres.

Sections of the retina were made at various parts distant from the optic disc. In most of them the nerve-fibre layer contained a greater or less number of inflammatory corpuscles resembling those present at the optic disc. The layer of rods and cones was entirely absent from some specimens, and in none was it at all complete. The other layers varied in different sections; in some they were normal, in others the granule layers were ill-defined and the nerve-cells seemed scanty and far apart. In all the sections Müller's fibres were wanting in sharpness of definition, and appeared too thick. The appearances generally were suggestive of œdema accompanied by inflammatory effusion, the latter being confined to the innermost layer of the retina. The disturbance of the rods and cones was no doubt due to the material poured out from the inner surface of the choroid.

*78. *Syphilitic Iritis of one Eye only, followed by disseminated Choroiditis, detachment of Retina and shrinking of Eye—Excision twenty months after primary disease—Microscopical examination of the Choroid—The Ophthalmitis associated with severe rupial rash—Patient salivated in early stage of disease.*

Sarah T., æt. 25, under the care of Mr. Hutchinson, and subsequently of Mr. Hulke. About twenty months before excision of her left eye, she had sores on the genitals followed by a rash and inflammation of the left eye. She attended at a hospital and was salivated on account of the eye. While taking the mercury her rash began to ulcerate and continued in a rupial condition for many months afterwards. She stated that never at any time was the right eye affected, and that the eruption had been much less severe on the right than the left side of the body. She was admitted under Mr. Hutchinson's care about ten months after the primary disease. She then had iritis of the left eye, and large ulcerating patches on the head and on one leg. She was cachectic and still salivated. She attended for more than two months, using strong atropine drops to the eye, black wash to the sores, and taking ten-grain doses of iodide of potassium (latterly increased to fifteen grains) three times daily. Her health improved; all signs of active inflammation of the eye disappeared, but the pupil was excluded; the ulcerations almost completely healed. She then ceased attendance for about seven months, and during this interval she had a miscarriage. At the end of that time she again came to the hospital complaining that the left eye had lately begun to pain her afresh. There was slight ciliary congestion and considerable diminution of tension. The lens was opaque. After continuing the same treatment as before for a few weeks without marked change in the symptoms, she became impatient, and applying on another day was admitted under Mr. Hulke's care and had the eye removed by him on August 19th, 1871.

Immediately after excision the globe was very soft, slightly shrunken, and somewhat squared. The *cornea* was clear. There was no anterior chamber. The pupil was blocked partly by uveal pigment, partly by white membrane. The eye was placed in a two per cent. solution of chromic acid for four hours in order to

harden the sclerotic, and then divided in the antero-posterior direction.

The *lens* was opaque, soft, and somewhat shrunken within its capsule. The *retina* was extensively detached and much shrunken, so as to form an almost solid column. It remained attached at the optic disc and ora serrata, and along a belt about ·16 inch (4 mm.) wide passing between those two parts along the lower and inner part of the globe. Its outer surface was sprinkled with pigment spots. The subretinal space was filled by fluid which contained a great deal of cholestearine. The *choroid* was everywhere in apposition with the sclerotic. At the region of the yellow spot, and at the outer part of the equator, were two large patches from which the epithelium was almost entirely absent. They were of a whitish colour, and their borders were ill defined. These two patches almost joined each other. Situated on these whitish areas were a number of slightly raised white spots as large as split millet seeds. In other parts the epithelium was a good deal disturbed, being absent from some spots, but more frequently heaped up into little hillocks. Sections of the choroid were made from the whitened area near the yellow spot, and one of them included one of the little tubercles above mentioned. In these sections the epithelium was either totally absent or represented by a solitary cell here and there. The elastic lamina at this part was much wrinkled in some sections, but showed no other unusual appearance. The chorio-capillaris was in many parts thickened slightly, and in the section above-mentioned as including one of the tubercles this thickening was very considerable over a small area. (This area of increased thickening probably formed the tubercle ; I say "probably," because no elevation of the elastic lamina was visible in the vertical section which showed the circumscribed thickening, a fact which may probably be accounted for by the pressure of the razor.) The thickening was very evidently due to the presence of pus-like corpuscles, of which there were several smaller and larger collections, the largest of course giving rise to the limited area of greatest thickening above mentioned. These cells had just the size of pus-cells and were faintly granular ; where they were few in number they were generally noticed to be close to blood-vessels. There was no general infiltration of the choroid with these pus-like corpuscles ; on the contrary they were entirely absent from a considerable part of

almost every section. The vessels, both of the chorio-capillaris and of the deeper layers, were full of blood and some of the larger ones distended. Another section was taken from a part where the epithelium was disturbed, but not extensively removed. In one of these two or three minute hillocks of epithelium were seen ("colloid" disease of the elastic lamina in an early stage). The largest consisted of about a dozen epithelial cells raised from the elastic lamina by transparent faintly granular matter; the cells preserved tolerably well their relative positions, and thus formed a sort of pavement over the minute lump of granular matter; their edges were, however, slightly separated from one another. The smallest hillock required only about three epithelial cells to cover it. These colloid bodies were numerous. In the same section at other parts small spaces occurred, from which several successive epithelial cells were absent, giving rise to minute pale dots when seen from the surface.

Besides the "colloid" bodies connected with the elastic lamina, a pathological result of another kind was found by Dr. Hermann Pagenstecher, who was kind enough to make a careful examination of this eye. Dr. Pagenstecher found that, besides the existence of the circumscribed inflammatory deposits above described, there was also a development of connective tissue in the form of minute pedunculated tumours upon the inner surface of the choroid. These tumours differed from the much smaller "colloid" bodies in being composed of distinctly nucleated fibrous tissue, the fibres of which formed a close network. They were not nearly so numerous as the "colloid" bodies. Some of them were situated directly over the deposits of lymph cells above described, and Dr. Pagenstecher thinks it probable, although he has not succeeded in demonstrating the fact, that a rupture of the elastic lamina took place through which inflammatory corpuscles might pass to the inner surface of the choroid. The narrowness of the foot stalk by which each little tumour is attached makes it very difficult to get a section exactly through its centre, and unless this can be done the (supposed) aperture in the elastic lamina cannot be seen.

Rheumatic Inflammation of the Eye.

The following is an account of a very interesting specimen (No. 104), in which glaucoma followed chronic irido-cyclitis, in a decidedly arthritic patient. The iritis was of that well-characterised form in which the pupillary margin of the iris becomes everywhere firmly adherent to the lens-capsule, but its periphery, remaining free, gets bulged forwards by distention of the posterior chamber.

* 104. *Chronic Iritis excluding pupil twelve months before excision —Secondary Glaucoma—Complete blindness six months—Iris bulged forward—Ciliary congestion—Pupil nearly covered by Vascular Membrane—Chronic plastic Cyclitis—Chronic inflammation of Vitreous with formation of blood-vessels in it—Old peripheral Choroiditis and Retinitis—Optic Disc cupped—Patient arthritic—No evidence of Syphilis.*

William H., æt. 42, a coach-painter, under the care of Mr. Hutchinson. Admitted October 23, 1871. Twelve months before he came to the hospital both eyes were "blood-shot" for a short time. He had no pain. He applied leeches, and the right eye recovered perfectly, but the left gradually deteriorated and became quite blind six months after the attack began. Six weeks before admission the left eye began to fail gradually and without pain, as the right had done, but it did not again become congested, as it had at the first attack. When admitted the *left eye* was quite blind, T+. Its pupil was excluded completely; the iris (of a clear gray-blue colour) was bulged forwards, and was tremulous at its periphery. There was dusky ciliary congestion. In the *right eye* the pupil was also excluded; there was, however, only the slightest possible ciliary congestion, and he could with this eye just see 2 J. The left eye was excised. Iridectomy was performed in the right, with beneficial result.

The patient stated that he was "slightly rheumatic" in his knees, ankles, feet, and hands. On enquiry it appeared that two winters before he came to the hospital he had been laid up for a couple of months with pain and great swelling of his left foot, and that since that attack he had several times been obliged to leave

off work for a few hours on account of pain in various joints. His left foot remained rather weak. No lips were present on his femoral condyles. He knew of no family history of any arthritic complaints, though he was acquainted with most of his relatives. He showed no signs of inherited syphilis, nor did two of his brothers, who were afterwards seen. There was no history of any suspicious symptoms in any of the family. The patient himself, apparently very truthfully, denied ever having been exposed to the risk of contagion. He had been married for sixteen years. Six years before admission he had a fit in which he lost consciousness, and which was followed by prolonged imperfect left hemiplegia. Though he worked in paints containing lead, there was no history of any symptoms of lead poisoning.

The eye was placed in chromic acid for two days, and then divided transversely. The cornea was afterwards removed to show the iris.

The inner part of the *iris* was found to be closely adherent to the lens-capsule; the pheripheral part was bulged forwards by fluid which separated it from the lens-capsule. After the ciliary attachment of the iris had been divided, the latter was found to be perfectly free until its pupillary border was approached, where over a narrow belt corresponding to the sphincter pupillæ, it was firmly united to the lens-capsule by tough white lymph. Considerable force had to be employed to separate this part of the iris from the lens. The posterior surface of the iris, with the exception of the inner circle, was perfectly healthy, and covered by a uniform layer of uveal pigment. On examining the pupillary area after the iris had been quite separated from all its attachments, a thin membrane was found stretching across it. It was incomplete at one part, an oval aperture extending from one part of the pupillary edge about half way across the pupil. That part of the pupillary edge of the iris to which the membrane was attached (forming about $\frac{7}{8}$ of the entire circumference) was thinned, and its tissue spread out somewhat, as if contraction of the radial fibres of the iris had occurred before this part was quite firmly fastened to the lens-capsule. The edge of the remaining $\frac{1}{8}$ of the pupil, from which no membrane passed to the pupillary area, was normal. The membrane itself, when magnified 160 diameters, was seen to be composed of connective tissue, with numerous branching corpuscles, and a considerable number

of blood-vessels. The blood-vessels formed a coarse meshwork which reached across about $\frac{1}{3}$ of the width of the pupil; they were all of small size, and none contained more than a single row of blood-corpuscles, and many were quite empty; none of them showed any muscular coat. They were continuous with larger vessels at the pupillary edge of the iris.

The *lens* was opaque, and in its normal position. The *retina* was opaque from the action of chromic acid, and *in situ* everywhere; it presented no signs of disease to the naked eye; its large vessels were very full of blood. The *optic disc* was deeply and evenly cupped. The *retina* was examined microscopically at its front part. At about ·2 inch (5 mm.) from the ora serrata it was apparently quite normal in all respects when magnified 450 diameters. Sections taken nearer the ora serrata (·1 inch = 2·5 mm. from that line) showed changes in the bacillary layer, while here and there small masses, or isolated granules, of dark brown choroidal pigment could be seen in various parts of the retina, chiefly, but not exclusively among the elements of its outer layers. The rods and cones in the part mentioned had lost their regularity of shape and uniformity of position. They were placed at various angles with the limiting membrane, and were often bent, and their choroidal ends enlarged, or otherwise altered in form; in number, too, they were very deficient, so that there were many empty spaces more or less circular in form, and wide enough to contain two or more rods, between the choroid and outer limiting membrane of the retina. No changes were observed in the inner layers of the retina excepting quite close to the ora serrata, where many sections showed the condition called "œdema" of the retina in a very marked degree. This condition is brought about by hypertrophy of the vertical connective-tissue pillars, and atrophy of the nerve and granule layers; so that spaces of considerable size are left between the overgrown fibres of Müller, while the retina is at the same time much thickened by the hypertrophic lengthening of those fibres.

The *choroid* was examined with the overlying retina in vertical sections ·2 inch (5 mm.) from the ora serrata, and further forwards. No changes were observed in those parts where the corresponding retina was healthy; but where the bacillary layer of the retina had undergone the changes already described, the superjacent choroid showed evidences of epithelial disturbance.

The hexagonal cells of these parts had more or less lost their outlines; here and there two or three cells were piled upon one another, whilst now and then several cells were altogether wanting. The commencing pigmentation of the retina in these parts was doubtless due to colouring matter derived from the choroidal epithelium. The deeper layers of the choroid showed no noticeable alterations.

The *vitreous* was opaque, tough, and stringy. The hyaloid separated with unusual ease from the retina until the ora serrata was reached, and there it became more adherent than is commonly the case. Near to the ora serrata, and attached to it firmly, the vitreous contained numerous densely white, tough threads and bands; this change was most marked over about $\frac{2}{3}$ of the circumference of the globe.

The *ciliary processes* over $\frac{2}{3}$ of the ciliary area were shrunken, and their apices ·062 inch (1·6 mm.) from the margin of the lens; this alteration was most developed in the part corresponding to the opaque and fibrous vitreous.

Microscopical Examination of the parts in the Ciliary Region.—Portions of hyaloid and vitreous stripped off from the ciliary retina and ora serrata contained a considerable number of large cells, either round or caudate, mostly with one, sometimes with two or more, nuclei. Some of the tough, white bands which passed from the ora serrata into the vitreous humour consisted of bundles of well-formed fibrous tissue which sometimes contained blood-vessels. Vertical sections through all the tunics showed abundant evidences of chronic and still progressing inflammatory changes beginning in the inner layers of the ciliary muscle. These changes had advanced furthest at a point about midway between the ora serrata and ciliary processes. At this head-centre of inflammation the inner layers of the ciliary muscle were crowded with lymph corpuscles, most of them round, but not a few of various shapes, indicative of commencement development into connective tissue; in some parts there was also a considerable matrix of reticulated fibrous tissue between the lymph corpuscles. The pigmented epithelial layer covering this part of the ciliary body was protruded somewhat towards the vitreous by the swelling of the superjacent muscular and fibrous layer; and its line was moreover much broken and its cells widely separated from one another, by crowds of lymph-corpuscles, which, continuous on the

one side with those already described in the ciliary muscle, passed on the other into a similar collection quite on the inner (vitreous) surface of the ciliary epithelium. The ciliary retina was slightly detached by this accumulation of inflammatory products, and it was abundantly infiltrated by them, as were also the corresponding suspensory ligament and hyaloid. In front of and behind this centre of inflammation, the lymph corpuscles became gradually less numerous, and close to the ora serrata there were few if any of them in the ciliary retina, and only a fair sprinkling of them in the suspensory ligament and hyaloid. The great majority of these cells were round, and about as large as pus-corpuscles. In some sections, however, those of them between the ciliary retina and the uveal epithelium, at some little distance from the inflammatory centre, had undergone changes into various forms of stellate and branched cells, whose processes were in contact with pigmented epithelium on one side, and ciliary retina on the other. In the hyaloid, also, the great majority of the cells were much larger than pus-corpuscles, and contained large nuclei. It has been already mentioned that blood-vessels were seen in some of the fibrous bands which passed from the ora serrata into the vitreous. I hoped to obtain abundant evidence in vertical sections of vessels passing in the vitreous, but I succeeded only very imperfectly. In only two vertical sections could any vessel be seen in front of the ora serrata. In one of these a small vessel containing a single row of blood-corpuscles made its appearance in the connective tissue of the retina at the ora serrata, and passed from thence forwards for a very short distance into the fibrous membrane on the inner surface of the ciliary retina (the commencement of the suspensory ligament); there it was lost. In the other section a very short piece of a small vessel containing blood-corpuscles was seen in the suspensory ligament just in front of the ora serrata, but it could not be traced backwards to the retina at the ora serrata, nor inwards into the vitreous.

Eyes Lost by Simple Glaucoma.

*75. *Perforating Ulcer of Cornea in an old Glaucomatous Eye —Hæmorrhage between Choroid and Sclerotic—Retina detached, &c.*

Anne B., æt. 47, under the care of Mr. Critchett. She had been under care at various times for more than four years, and had been treated for glaucoma of each eye at different dates. In August, 1871, she again came with a sloughing ulcer, which had perforated the centre of the right cornea. The globe burst at the corneal perforation during excision. It was afterwards hardened in spirit and water, to which some bichloride of mercury had been added, and then divided vertically from behind forwards.

There was no lens. The cornea showed a large hole at the centre, which was partly filled by a plug of semitransparent vitreous. The *retina* was detached in numerous folds, remaining attached at the optic disc and ora serrata. The *vitreous space* was thus much diminished. The vitreous and the retina were both blood-stained. The choroid was detached from the sclerotic by a thick layer of blood everywhere, excepting at the lower and back part of the fundus, where it was still in contact with the sclerotic. The blood extended in front as far as the attachment of the iris and ciliary body to the sclerotic. Part of this eye is preserved in the museum of the London Hospital Medical College.

105. *Inflammatory attack with Ulcer of Cornea in an Eye Blind for three years from neglected Glaucoma—Lens slightly Shrunken—Optic Disc Cupped.*

William P., æt. 32, under the care of Mr. Couper. Thirteen years before excision he had an attack in the right eye, during which the sight became "foggy." It lasted five weeks, and he believed that the sight became as good as ever again. He was under treatment at an Ophthalmic Hospital, but had no operation performed. Four years before excision the same eye gradually failed. The attack was described as similar to the earlier one, but instead of passing off it got worse, and in twelve months the eye had become quite blind.

He came under care in September, 1871, for an ulcer of the right cornea, three years after the eye had become blind. The ulcer granulated and became vascular. The eye was very hard (T + 2), and remained for several weeks painful and much congested. It was excised on October 31. The other (left) eye was perfect, and had never at any time been defective.

The right eye was placed for 24 hours in chromic acid, and then divided into halves. The *pupil* was round and quite free, but eccentric. The *lens* was perhaps slightly shrunken, its margin being further than usual from the apices of the ciliary processes. The *vitreous* contained several recent hæmorrhages of small or moderate size, situated near the hyaloid in front of the ora serrata They very probably occurred during the operation of excision. The optic disc was very deeply cupped. There were no naked eye appearances of any other disease, excepting the granulation mass at the lower margin of the cornea, on the seat of the former ulcer.

Myopia.

*59. *Spontaneous Inflammation of a Myopic Eye—Sight lost in two weeks—Excision four months after beginning of attack—Extensive Subretinal Hæmorrhage — Retina detached and shrunken—General enlargement of Globe—Posterior Staphyloma.*

George R., a farm labourer, 65 years old, under the care of Mr. Wordsworth.

His left eye had always been "short-sighted;" he could see near objects well with it, but not those which were far off. Four months before excision this eye inflamed, as he believed after exposure to cold. The eye was very painful. He believed that all sight was lost in about two weeks. He stated that attacks of pain had continued to trouble him at intervals of a few days, ever since the eye failed, and that the pain in the eye had always been accompanied by pain and "soreness" in the head. There was no history of syphilis, or of rheumatism.

Condition at date of Excision.—He was a robust, healthy-looking man. His left eye was quite blind, and diverged (he believed that it had always "turned out"). There was considerable congestion of sclerotic and conjunctiva. A small cyst

was present at the edge of the cornea. The cornea was clear. Anterior chamber shallow, pupil wide, irregularly round, fixed, and displaced upwards; there were spots of uveal pigment adhering to the lens-capsule. The iris was dull greenish in colour. The lens was opaque. Globe excessively tender, so that he would scarcely allow of pressure with the finger tips; T perhaps normal, but it could not be accurately tested. The other (right) eye was perfect, but irritable; its iris was blue.

The globe was placed in Müller's solution for a fortnight.

The eye was slightly enlarged in all directions. From the centre of the cornea to the position of the yellow spot (outside the eyeball) measured 1·15 inches (28·75 mm.); the transverse diameter at the equator was 1·15 inches (28·75 mm.); the vertical diameter at the same part was 1·075 inches (26·87 mm.). There was noticeable bulging of the sclerotic at the region of the yellow spot, and between the superior and external recti.

The *retina* was detached and shrunken into a firm pillar, attached by its narrow end to the optic disc, and by its expanded foot to the ora serrata; there was no vitreous space. The subretinal space was full of blood, partly clotted, but for the most part forming a chocolate-brown fluid. The red corpuscles were well preserved, both in the clot and the red-brown fluid; their outlines were circular. In the fluid there was, besides blood corpuscles, much fine brownish molecular matter. In the clot there were, in addition to the red blood discs, a good many large granule cells, each containing a nucleus as large as a red blood corpuscle. The nuclei of many of these cells were highly pigmented, and of a dark brown colour, the rest of the cell substance in such cases having a much lighter shade of the same colour. The *choroid* looked thin in all parts. Its epithelial cells were round, most of them enlarged, and many of them contained several nuclei. In the elastic lamina there were numerous very beautiful blood-crystals, needle-shaped or thorn-shaped, and grouped in bundles or stellate figures. The elastic lamina in some parts could be readily peeled off from the subjacent choriocapillaris. The choroidal stroma in the parts examined was totally devoid of pigment, and was composed almost wholly of straight fibres having definite outlines, and running for the most part parallel to each other. There was a posterior staphyloma of the sclerotic and choroid nearly surrounding the optic disc;

it formed three-fourths of a circle, the lowest fourth being deficient. This staphylomatous crescent was widest at the outer side of the disc. Its margin was well defined everywhere, although least so at its widest part, that towards the yellow spot. The distance between the centre of the optic disc and the outer (yellow spot) margin of the crescent was not quite ·1 inch (2·5 mm.).

Intra-ocular Tumours.

*94. *Melanotic Sarcoma of Ciliary body and Choroid producing at early period Secondary Deposits on outer surface of Sclerotic without thinning or perforation—Gradual failure of Sight for about ten months; some Sight remaining at time of excision—Never any Inflammatory Symptoms—Ophthalmoscopic Diagnosis of Intra-ocular Tumour and partially detached Retina—Microscopical demonstration of passage of Pigment Cells along Blood-vessels through Sclerotic.*

John Moules, æt. 62, Stevenage, Hertfordshire, a farm labourer, admitted under the care of Mr. Wordsworth, on September 30, 1871. Notes taken on admission:—"He noticed nothing amiss with the left eye until about December, 1870, when he saw that there was a black speck on the outer part of the white of the eye. He does not know at all accurately when the sight of this eye began to fail, but seems to think that it had failed partly before he noticed the black speck. The sight continued to get worse, but at Easter time (in April), 1871, he still had fairly good sight with this eye. He has never had any pain or redness of the eye. He has almost black hair, and swarthy complexion. He knows of no family history of tumours. *Present condition:*—Left eye can see a light held at the temporal side. Pupil rather dilated, fixed; iris not discoloured. No congestion of any part of the eye; no pain. Tension rather diminished. On the sclerotic, near to the outer margin of the cornea, there are several black patches; they are slightly raised above the level of the surrounding sclerotic, but the conjunctiva is not perceptibly stretched by them, and it is perfectly movable over them. They are four or five in number. Two are much larger than the rest, being about ·1 inch (2·5 mm.) in diameter, while the others are mere specks. There is no alteration in the shape of the globe, nor any exophthalmos. *Ophthalmoscopic examination:*—The

normal choroidal reflex can be obtained only at the inner and upper part of the fundus (erect image). The retina is detached slightly at the lower and inner part, but not so much as altogether to prevent transmission of light to the choroid. The whole of the outer part of the field gives a perfectly black reflex, which ends near the vertical middle line by a sharply defined edge."

The eye was excised on the day of admission, and placed for five days in chromic acid. Its transverse diameter outside the sclerotic was 1·05 inch (26·5 mm.); its vertical diameter, in the same relation to the sclerotic, 1 inch (25·3 mm.). The globe was divided in the antero-posterior direction from above, downwards and outwards.

The *retina* was *in situ* at the inner and upper part. It was detached in folds at the lower as well as at the upper and outer parts of the eye. The greater part of the outer half of the eye was occupied by a uniformly black tumour, which was attached to the choroid and pushed the retina before it. Its base, at about the middle, where it was divided, measured ·55 inch (13·9 mm.), and extended from close to the ciliary processes in front to a short distance behind the equator. Its thickness, measured from the middle of its base to its most prominent point, was ·65 inch (16·25 mm.), and reached about to the level of the optic disc. The retina covered only its most prominent part, and was in that place more or less thinned and adherent to the tumour. The tumour projected inwards and somewhat backwards. The greater part of its surface was pretty evenly rounded, and there was a slight constriction near its base giving it a somewhat fungiform shape. It was not in contact with the choroid anywhere, excepting by its base. It was nowhere nearer to the lens than ·05 inch (1·25 mm.). The largest of the black patches beneath the conjunctiva was opposite the centre of the base of the tumour; the greatest thickness of this patch was about ·02 inch (·5 mm.). The other parts of the eye appeared normal. The intra-ocular tumour was found to consist of cells, most of which were pigmented, although there were considerable numbers devoid of pigment. The majority of them were spindle-shaped, but all forms were represented, from the typical spindle-cell to the sphere. All the cell-forms showed some examples pigmented and others without any pigment. Careful naked eye examination failed to detect any discoloration or thinning of the sclerotic which separated the intra-ocular

tumour from the largest of the subconjunctival black patches (only the largest of the patches was specially examined as to this feature). A number of thin sections were made, including the whole thickness of the subconjunctival growth, and of the sclerotic, together with part of the subjacent intra-ocular tumour.

When these sections were examined with a magnifying power of 30 diameters, a number of pigmented lines were found in the sclerotic between the two growths. They ran in various directions, the majority however having a course parallel with the scleral fibrous tissue. The lines frequently gave off branches at right angles, or nearly so, the branches being generally smaller than the stems from which they proceeded. They occurred in all parts of the sclerotic between its inner and outer surface, and one of them communicated directly with or appeared to take its origin from the melanotic mass in the choroid. This one is shown in the accompanying figure (fig. 1). It will, however, be seen from the wood-cut, that these pigmented lines were more numerous in the outer than in the inner layers of the sclerotic, and in the subconjunctival tissue in front of the extra-ocular growth they became very numerous. In none of the sections could any single line of pigment be traced completely through the sclerotic. It will be observed in the specimen from which the figure was taken (and this was the case in all the sections), that these dark lines were most abundant in a part somewhat in front of the extra-ocular growth, and that the sclerotic between the thickest part of that growth and the intraocular tumour was comparatively free from them. From the size, relative number in the outer and inner parts of the section, and manner of branching of these pigmented lines, there seemed to be no doubt that they were the normal blood-vessels of the part surrounded

Fig. 1. Section through the extra-ocular growth, conjunctiva, sclerotic, and part of the intraocular tumour, showing the pigmented lines (blood-vessels) in the sclerotic between the primary and secondary tumours. × 15.

by pigment; and this conclusion was borne out by their appearance under higher magnifying powers.

When magnified 250 diameters and upwards, the pigment was found to consist of small masses of dark-brown colour. They varied a good deal both in size and shape, many being round, others elongated and more or less spindle-shaped; most of the round ones were somewhat larger than red blood-corpuscles.

Pigmented lines, which with a low magnifying power appeared single and uniformly dark, were found, when highly magnified, to consist in many parts more or less distinctly of two lines, the interval between which was comparatively free from pigment, and was formed by the cavity of the vessel. In two or three cases the pigment gradually thinned off and allowed the cavity of the vessel containing well-preserved blood-corpuscles to be seen. There was in many cases a more or less definite appearance of a fibrous structure between the pigment cells and running parallel with the course of the vessels; this was no doubt due to the longitudinal coat of the latter. Many of the small pigmented vessels were cut transversely or obliquely across, but the mass of pigment around them was generally so thick as to obscure the cavity of the vessels. Beneath the centre of the extra-ocular growth, and close to the outer surface of the sclerotic, was a large vessel (probably an artery) which was cut across in most of the sections, and in whose coats a number of pigment cells were found (fig. 2).

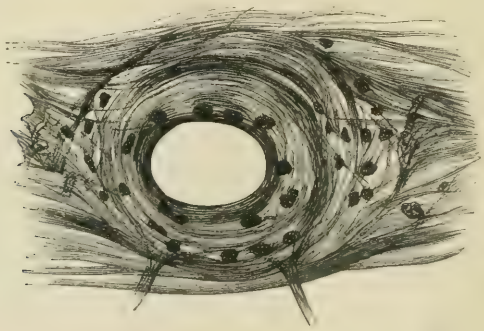

Fig. 2. Transverse section of the vessel which ran beneath the centre of the extra-ocular tumour, showing pigment cells in its coats. × 250.

This vessel communicated with another large one which ran forwards from it at right angles, and lay also in the extreme outer layer of the sclerotic, if not in the loose subconjunctival tissue; this vessel is seen in fig. 1. For a considerable distance it shows no pigment, but as it passes forwards it becomes gradually darkened, and in front communicates with several highly pigmented vessels. It seems probable that the exact location of the extra-ocular growth was, to some extent at least, determined by the position of the large pigmented vessel (fig. 2) on the surface of the sclerotic. There can be no reasonable doubt that this vessel had pigmented branches which communicated indirectly with the smaller pigmented vessels in the deeper layers of the sclerotic, and that the pigmented cells in its sheath may have been derived from these, although the only considerable branch which was actually seen to be given off from it was in great part free from pigment cells. It is, however, to be observed that the subconjunctival tissue for some distance in front of the extra-ocular growth contained numerous highly pigmented vessels which communicated directly with many of those in the sclerotic, and that this pigmented subconjunctival network was continuous with the front border of the growth (its hinder border did not communicate with pigmented vessels, but was quite sharply defined). It is, therefore, quite possible that while the growth and multiplication of the melanotic cells so as to form the extra-ocular mass was influenced by the presence of a copious blood-supply from the vessel (fig. 2) beneath them, still, the actual carriage of the earliest infecting cells or nuclei may have been effected by some of the subconjunctival vessels just mentioned.

*66. *Melanotic Sarcoma of Choroid; perforation of Sclerotic, and large extra-ocular growth—Retina detached—Eye becoming Blind (after parturition) four years before excision—Commencement of pain, &c., two years later—Enlargement of Eye noticed twelve months—No recurrence five months after operation—History of Cancer in a Sister; and of loss of one Eye (without injury) in Father and two Sisters.*

Martha Garrard, æt. 38, living at 4, Marian Place, Pritchett's Road, Hackney Road, London; under the care of Mr. Critchett. The following notes were taken at the time of her admission,

August 4, 1871 :—" She is a thin woman, and has been losing flesh for about twelve months. She is still suckling her youngest child now aged sixteen months. Four years ago, while lying in with her sixth child, her left eye became blind : it was not painful at that time, nor until two years later, when she began to suffer from severe shooting pain around the eye and in the same side of the head (and perhaps in the eyeball itself, but this is not certain from her account). About twelve months ago, soon after her last confinement, she first noticed that the eye was beginning to enlarge ; she has had occasional pain since the enlargement began, but it has been of a less severe character than formerly."

"*Present Condition.*—The left eye looks enlarged. The enlargement is due to a considerable lobulated black mass which forms a protrusion at the upper and inner part of the globe. The sclerotic covers the growth everywhere, but is very much thinned and looks as if on the point of giving way. Conjunctival veins very large and tortuous. Cornea hazy. Anterior chamber shallow. Pupil fixed. Lens opaque."

"*Family History.*—One of the patient's sisters died at the age of 40 years of 'tumours in the breast, which went all over her, and formed a lot of hard lumps.' The same sister, a short time before her death, lost one of her eyes ; the patient states that it became blind spontaneously and afterwards shrunk up. Another sister, a twin to the patient, has also lost an eye ; it is her right eye, and is stated to have been lost very shortly after a confinement ; it is said to have become smaller than it was. Lastly, the patient's father lost his left eye by some 'inflammation ;' the patient states that it had not been injured, and that it also shrunk up."

The eyeball was excised on the day of admission. The tumour had perforated the sclerotic at the back of the eye to the inner side of the optic nerve, and a large portion of the growth was thus extra-ocular. This portion was removed partly in company with the globe, and partly afterwards by scissors.

The eye was hardened in chromic acid, and then divided nearly vertically from behind forwards. The upper part of the globe was occupied by a large somewhat spherical pigmented tumour, which sprung by a very broad base from the choroid, to which it was attached from a point just above the optic disc as far forward as the ora serrata.

It had grown chiefly downwards into the globe, but partly upwards also, so as to cause a considerable increase of the vertical diameter of the eyeball, which measured 1·075 inch (27·42 mm.). The greatest vertical thickness of the tumour was about ·75 inch (18·75 mm.). The lowest part of its inner surface was level with the lower margin of the lens, and about ·5 inch (12·65 mm.) behind it. The hindmost part of the free surface of the tumour was in close contact with the optic disc, from which it had detached the retina. Its cut surface was unequally pigmented; the parts nearest to the choroid were for the most part almost black, the thickest mass of highly pigmented tissue being close to the base of the extra-ocular growth. Towards the centre of the mass there was a large and tolerably well-defined portion of pale brown or buff colour. All the rest of the tumour was of a mottled brown, intermediate in depth of tint between the above extremes.

The sclerotic covering the outer surface of the tumour was extremely thin, and indeed was altogether invisible to the naked eye for a short distance at the hindmost part of the globe. Outside the eyeball, and springing from or through the most attenuated part of the sclerotic, was a large extra-ocular growth, the whole of which together was about as large as a filbert. The greater part of it was lightish gray in colour, and contrasted strongly with the dark tumour within the eye. The apparent perforation of the sclerotic above-mentioned was at the middle of the base of this extra-ocular tumour. The *retina* covered and adhered to the inner surface of the intra-ocular growth; it was detached in folds from the greater part of the remaining choroid. The *vitreous* was shreddy, tough, and semi-opaque. The lens was opaque in the centre, of normal size, and not displaced. The *anterior chamber* (contrary to the observation made during life), was quite of normal depth, neither iris nor lens being pushed forward in the least. The primary (intra-ocular) tumour consisted of pigmented spindle-shaped cells, among which were some having several processes like the stellate cells of the choroidal stroma. The structure of the extra-ocular growth was much the same; the cells of which it was composed however contained less pigment, and had shorter processes, many of them indeed being oval or round.

This patient was seen again on January 19, 1872 (five months

after the operation). There was then a mass of healthy-looking granulations, as large as a pea, springing from the centre of the conjunctival scar; it was not hard, nor was it in the least pigmented. No spots of pigmented tissue could be seen in any part of the conjunctiva. She was pregnant.

Besides the specimens marked * in the above Report as added to the Pathological Collection of the Museum, a number of injected preparations of the structures of the healthy eye and orbit have been made. They form two series.

SERIES I.—*Transparent Injections (for the microscope) of the structures of the Human Eye and Orbital Tissues.*

1. The conjunctiva of the eyelid. Arterial injection.
2. The same. Arteries red, veins blue.
3. The vascular supply to the meibomian follicles, seen from the inner surface after dissecting off the conjunctiva. Arterial.
4. Sections through the upper lid, showing all the structures from conjunctiva to skin. Arterial.
5. The capillary network at the edge of the cornea. Arterial.
6. A part of Schlemm's canal. Venous.
7. The lacrymal gland. Arterial.
8. The same, mounted in Canada balsam.
9. Part of the muscular tissue of one of the recti at its junction with its tendon. Arterial.
10. The whole iris. Arterial. The pigment at the back of the iris removed. This preparation shows well the long radiating arteries in the outer ring, and the network of capillaries in the sphincter pupillæ which constitute the lesser vascular circle.
11. Section through the sclerotic, cornea, ciliary body, and iris. Arterial. The pigment partly removed from the ciliary body.
12. The same. Arteries red, veins blue.
13. Arteries and capillaries of the ciliary body.
14. Part of choroid (front part), ciliary body and iris showing the arteries and capillaries of the two first and the long vessels of the iris. Arterial. The epithelium removed.
15. Part of choroid and ciliary body. Arteries red, veins

blue. The epithelium removed; showing the arteries, capillaries, and venæ vorticosæ of the choroid, the veins and capillaries of the ciliary body, and the long arteries of the iris.

16. The choroid near the optic disc. The epithelium removed. Arterial.

17. The same. Arteries red, veins blue.

18. The retina at and around the yellow spot. Arterial. Viewed from the inner surface. The injection has filled all the capillaries and in many cases has passed on into the veins. The yellow spot itself is quite devoid of vessels the capillaries forming a series of loops around and close to it.

19. A piece of the same retina from another part of the fundus.

20. A piece of the same retina near to the ora serrata. The capillary network here has much larger meshes than at the back of the eye. None of the retinal vessels pass beyond the ora serrata; all form loops, close to that line, which return to the retina.

21. Vertical section of the same retina to show the position of the vessels in the inner layers.

22. The optic nerve, transverse and longitudinal sections. Arterial.

Series II.

1. The hyaloid artery and its branches in a kitten 1 *hour after birth*.

2. The same at 36 *hours*.

3. The same in a puppy at 4 *days*.

4. The same at 10 *days*.

5. The same at 16 *days*.

These specimens illustrate well the rapid decrease in the supply of blood to the lens-capsule, &c., after birth in animals born with coherent eyelids. This blood supply does not cease until several days after the eyelids separate from one another. The separation begins to take place about the 9th day, while some blood is still carried to the back of the lens as late as the 16th day, although at that date all branches of the hyaloid artery have become obliterated and only the central trunk remains; as late as the 10th day, however, there are still a considerable number of branches.

PART II.

A Periscope

OF

CONTEMPORARY OPHTHALMIC LITERATURE.

FORMATION OF BONE IN THE EYE.

H. KNAPP writes an able paper on this subject in the "Archives of Ophthalmology and Otology," 1871, p. 1-35. He first of all asks what membranes and which layer of each are the starting points of ossification? It remains doubtful whether true bone has ever been shown to have developed in the vitreous or the lens. It is incontestable that formation of connective tissue within the lens may take place. Since connective tissue is capable of ossifying wherever it exists, it may do so in the lens. Petrification is a process of regressive metamorphosis, and therefore not infrequent in old cataracts, especially those of a degenerative kind. Ossification, on the contrary, is an active process, requiring a good supply of nutritive material, for which the crystalline lens offers very unfavourable conditions, possessing, in its normal state, no blood-vessels. The retina and vitreous body are not very apt either to become the origin of ossification, the latter having no vessels of its own and the former also being but scantily supplied with blood. The uveal tract is the only coat in the eye which can furnish abundant supply of nutritive material to any new formation. The capillary layer is the principal source of nutrition, and ossification seems to originate always either in it or in inflammatory products derived from it.

Five cases are given in considerable detail, and an account of the microscopic examination in each case. Two other specimens are mentioned, but when examined were in a damaged condition. In the first case the patient was a girl aged 17. The left eye had always been liable to inflammation from early childhood. The other eye remained good. The two posterior thirds of the eyeball, as far as they could be brought to view, were to the touch as hard as wood; while the anterior third, that is the cornea and adjacent parts, were of normal consistence. The ossi-

fication was found to be limited to the capillary layer of the choroid. In the three following cases the eye had been injured years previously and sympathetic ophthalmia had resulted in the other. The patients were adult males. In the fifth case the patient was a woman, and had suffered from iritis, &c., during a a period of 19 years. The other eye had become inflamed.

The author sums up to the effect that when the process is still in a low stage of development the ossification takes place in small plates which lie in the chorio-capillaris, and are covered by the hyaline membrane and the epithelium of the choroid. If the morbid action be further advanced the more abundant exudation wrinkles, and perforates the hyaline membrane, invests the inner surface of the choroid, and is gradually converted into osteiod tissue. The retina remains sometimes in immediate contact with the inner surface of the osseous capsule, but it is generally separated from it, retaining, however, its attachments to the ora serrata and the optic disc, perforating the bone shell in the latter place. The abrupt termination of the osseous capsule of the ora serrata made Prof. Knapp think that the chorio-capillaris played an essential part in the production of the ossific deposit. The continuation of the ossifying connective tissue coat, covering the inner surface of the bone capsule into a false membrane stretching like a septum from the ora serrata transversely through the vitreous body, serves to bring the occurrence of osseous layers in this region into connection with the chorio-capillaris. The bone production did not originate in the ciliary processes in either of the specimens. "Formation of bone in the eye is the consequence and final stage of a plastic inflammation of the capillary layer of the choroid. It invests the inner surface of the choroid and continues in the form of a transverse septum, through the anterior part of the vitreous humour, behind the ciliary body and crystalline lens, without, however, involving these structures. The diseases which led to ossification are chronic inflammations of the interior coats of the eye, called internal ophthalmia by the older, irido-choroiditis by modern writers. It should be particularly mentioned that chronic plastic inflammation limited to the ciliary body and iris (irido-cyclitis), which is not uncommon and leads to the formation of false membranes before and behind the lens, has not been found to generate osseous tissue. Nor has ossification been demonstrated as a sequel of iritis alone. The diagnosis of ossification may be based upon the unyielding and hard condition of the posterior part of the globe, terminating about two lines behind the cornea, while the interior region is soft, or at least impressible. Simultaneous occurrence of calcification and ossification is frequent. Calcification may be diagnosticated by atrophy or degeneration of the iris, in combination with a shrunken white or yellowish cataractous lens. As ossification does not involve the outer choroidal layers, nor the ciliary muscle

and iris, it, in itself, is not to be dreaded as a cause of sympathetic ophthalmia. The latter only resulting from iridio-cyclitis supervening as a complication to ossific choroiditis. As long as an eye in which ossification is diagnosticated remains free from irritation, and its fellow also, the removal of the former, for fear of sympathetic inflammation, is not indicated. To corroborate this, I may state that I have not infrequently observed cases in which eyes bearing the signs of ossification, and even being tender to the touch, in the ciliary region were tolerated without annoyance for 20, 30, and 40 years."

PHLEBITIC OPHTHALMITIS.

Dr. Warlomont relates the following case:—

The patient was a veterinary surgeon, 53 years of age, of a robust constitution and habitually in good health. A week previously he had observed a boil above and to the inner side of the left eyebrow, just above the root of the nose. He pinched and irritated it causing it to inflame, and in three days an erysipelatous blush appeared and spread over the greater part of the face; the eyelids became œdematous, the skin of the nose became more shining than that of other parts, and the conjunctiva became slightly congested. He did not shiver. The boil was incised. The pulse was slightly quickened. On the seventh day the erysipelas began to subside. The next day throbbing pain was complained of in the left eye. The conjunctiva was slightly œdematous, the cornea was clear and vision intact. He had shivered slightly several times, when his bowels were acted on after the administration of a purge. On the evening of the same day the symptoms as regards the left eye had become more marked, the upper eyelid was more swollen and pushed forwards. The eyeball moved less freely and was somewhat pushed forwards. Some of the veins of the forehead were prominent and their course could easily be traced both with the eye and with the finger. On the ninth day both eyelids, especially the upper one, were reddened, shining, and pushed forwards by projection of the eyeball. A portion of œdematous conjunctiva, covered with sero-purulent fluid, bulged between the eyelids. The cornea was with difficulty exposed, but was quite transparent; the pupil was widely dilated and sight was quite lost. No fluctuation could be made out around the globe. There was no suspicion that the patient had inoculated himself with any poisonous material. The diagnosis which was made was that of phlebitis of the orbit and eyeball. Ophthalmitis, if not traumatic, is always dependent on some specific cause, generally purulent infection. In this case such a cause was not far to seek in the phlebitis of the veins emerging from the boil in a state of suppuration. On the tenth day the cornea had lost its transparency, the pupil was cloudy, the intra-

ocular tension was increased, and the iris pushed forwards. Evidently the interior of the globe was becoming affected, and probably there was effusion between the retina and choroid. The patient in the course of the day passed into a state of profuse perspiration, but had no fever and very little pain. On the eleventh day the patient was somewhat delirious. The right eye had also become slightly affected. He became comatose at midday and died in the evening. There was no post-mortem examination.—("Annales d'Oculistique," November—December, 1871, p. 229.)

AN OPHTHALMOSCOPE TO BE USED BY TWO OBSERVERS.

Dr. A. Sichel (fils) has devised an ophthalmoscope for use in demonstrations, &c., to enable a second observer to see with greater distinctness than is obtainable by others invented for the same purpose. A prism is placed behind the perforation in an ophthalmoscopic mirror in such a way that a part of the aperture is left uncovered by it. A portion of the rays falling on the perforation pass through to the eye of the primary observer behind, whilst the greater portion of the rays are refracted to one side of the prism, and can there be made use of by a second observer, who obtains a very distinct image. The whole apparatus packs in a small compass, and is held by a handle in one hand. It can also be fixed on to a table if desirable. Figures are given.—("Annales d'Oculistique," January—February, 1872, p. 57.)

A HANDY PRISMATIC COMBINATION.

M. Crétès, optician in Paris, has devised a prismatic arrangement by which he obtains the advantage of a whole set in a small compass. He makes use of the fact that if you place two prisms together, with their bases over each other, and their apices coinciding, you obtain double the refractive power, whereas if you try the converse you neutralise the prisms altogether. Between these two extremes a great variety of refractive powers may be obtained. Two prisms are placed in a little circular box mounted on a handle. On the stem of the handle is a button, which moves up and down, and rotates the prisms on one another. An index at the side shows the index of the refraction obtained in any position of the button.—("Annales d'Oculistique," January—February, 1872, p. 62.)

TREATMENT OF WOUNDS OF THE EYE BY SUTURE.

Mr. Thomas Windsor narrates a case in which he made use of a suture with great advantage in the treatment of a wound of

the ciliary region. The patient was a delicate looking lad, whose eye had been wounded by a large knife. There was an incised wound commencing in the upper and inner side of the cornea, and extending in the sclera backwards for fully half an inch; there was a nodule of prolapsed iris in the anterior part; the rest of the wound was gaping widely, and through it the vitreous was bulging, though none appeared to escape. The question of a suture at once arose. It appeared however inadvisable to give chloroform, because the child was certain to cry and struggle, and the least effort would probably force a quantity of vitreous through so large a wound. A bandage was applied. In a fortnight, the progress being slow, the nodule of prolapsed iris was removed. At the end of three months the centre of the wound still remained open, allowing of projection of the vitreous. A bandage was applied more tightly, but without effect. A month later chloroform was administered, the projecting nodule of vitreous was snipped off, and a suture applied through the middle of the wound. The stitch completely closed the wound. In four or five days the suture separated spontaneously, and the wound was firmly closed at the end of a fortnight. At the end of two months it is noted "wound appears firmly healed; pupil of good size, but a little displaced inwards, with a rather large coloboma extending to the margin at the inner and upper side; it reacts moderately to light. He reads slowly No. 5, and letters of No. 4 (Jaeger). The lens is not displaced, and it and the other media and the fundus are quite normal."

Other cases already published by various authorities are quoted. In conclusion Mr. Windsor says, "the effect of the suture has been too palpable to leave room for doubt. I think it is clear that whenever a wound of the sclera or cornea gapes, a suture should be applied, unless there is some special contra-indication. Chloroform should be generally employed, and the thread should be very delicate. If it causes little or no irritation, it will be usually the best plan to wait for its spontaneous discharge. The principal objections to the suture are the frequent necessity of chloroform for its insertion, and possibly for its removal; the difficulty of inserting it, and the risk of exciting inflammation." The latter appears to be very slight, judging by the cases hitherto recorded.

I may conclude with the suggestion that, as union at once followed in my case though the edges of the wound had been separated for many weeks, similar treatment would not be unlikely to have a similar effect in fistulæ of the cornea and sclerotic, which it has been hitherto found to be so difficult to close. —(Reprint from Manchester Med. and Sur. Rep., 1871.)

EXOSTOSIS OF THE ORBIT—REMOVAL—RECOVERY.

Letenneur (Gaz. des Hôp., 1871, p. 462) relates a case in which he successfully removed a large exostosis from the inner angle of the left orbit. It probably grew from the lachrymal bone.—("Annales d'Oculistique," January—February, 1872, p. 127.)

THE MODE OF PRODUCTION OF EXOPHTHALMIC GOÎTRE.

R. Boddaert has made experiments on the production of exophthalmic goître (Bull. de la Soc. de Méd. de Gand, April 5, 1870, and December 5, 1871). He has produced exophthalmos in rabbits by ligaturing the external and internal jugular veins at the root of the neck on both sides, and also dividing each cord of the sympathetic. The exophthalmos is produced almost immediately, and diminishes when the animal is lifted up by the ears, and increases when the head is dependent. Ligature of the four veins alone produced a transient exophthalmos. Division of the sympathetics only produces retraction of the eyes within the orbits. From the results of twenty experiments he concludes—1. That the ligature of the veins and the division of the sympathetic nerves produce a very marked exophthalmos, which remains for many days, and diminishes gradually in proportion as the collateral circulation becomes established, and as the effects of the section of the sympathetic tend to disappear. 2. The exophthalmos is due to the venous congestion within the orbit, and disappears on tying the carotid arteries, or putting the body in such a position that gravitation favours the venous circulation. 3. The influence of the section of the sympathetic is a real factor in the production of the exophthalmos. That resulting from ligature of the veins only is less marked, and disappears more rapidly.—("Annales d'Oculistique," January—February, 1872, p. 125.)

THE REGENERATION OF THE CRYSTALLINE LENS IN CERTAIN MAMMALS.

B. Milliot has written a long and able monograph on this subject ("Journ. de l'Anat. et Phys.," Paris, January—February, 1872). His conclusions are given in the "Annales d'Oculistique" of same date.

HOSPITAL GANGRENE AFTER REMOVAL OF EYEBALL, &c.

Dr. Warlomont relates a case in which he removed both eyelids and the eyeball for epithelioma of the eyelids. On the eighth day the wound was attacked with the pulpy form of hospital gangrene; it was covered with a grey, lardaceous, adherent mem-

brane. He sprinkled the whole surface with a layer of powdered camphor, and then applied simple cerate and a compress. The next day the surface looked much more healthy, and in another 24 hours there was no further cause for anxiety. The patient recovered quite well.—("Annales d'Oculistique," November—December, 1871, p. 296.)

CIRCUMSCRIBED CHOROIDITIS.

Dr. A. Sichel (fils) narrates six cases of circumscribed choroiditis, and makes some remarks on the disease. This affection was first described by Jaeger, under the name of "alteration in the region of the yellow spot." Dr. Sichel thinks, however, the particular characteristic is the presence of a change analogous to to that met with in disseminated choroiditis, but localised in one part of the fundus. This spot is often, if not generally, situated away from the macula lutea. The ophthalmoscopic appearances are given at considerable length. As to the pathological changes which occur, the opportunities for *post-mortem* examination in cases of circumscribed choroiditis have been exceedingly rare, and only in advanced stages. By examination of the fundus of the eye during the development of the disease by means of the erect image, the following changes have been detected. First of all is observed a slight swelling, situated in the choroid, and slightly elevating the retina. The pigmentary layer looks more or less displaced and indistinct, the fundus seems to absorb more light, and a slight serous effusion is perceptible. Before long, in addition to the twisted and opaque aspect of the affected spot, a brownish tint becomes diffused over the surrounding parts. At the same time if the patient happens to be fair, and the vascular trunks easily seen, a well marked congestion of the vessels can be recognized. The next step is that the deep tint of the affected part becomes paler, and is overshadowed with a whitish film, which hides the vessels, hitherto seen so distinctly. The white exudation becomes thicker and thicker, so as completely to hide the subjacent layers. In other cases, and, perhaps, more frequently, in the middle of the deeper coloured portion, two or three brilliant yellowish spots appear in close juxtaposition, reflecting the light strongly, and resembling fat globules. These small, brilliant spots increase rapidly, become confluent, and form one patch. After a short time, as the patch increases in size, its yellowish white tint becomes shaded with grey, more or less pronounced, and also it forms a marked projection beyond the level of the surrounding parts, and simulates more or less the development of a tumour. These appearances can be accounted for on considering the fact of the presence in all the lower animals, of one or more oil globules in the centre of the pigmentary cells of the choroid, as demonstrated by H. Müller. These oil globules are

more numerous the further one passes from the posterior pole to the peripheral portions of the fundus. This therefore probably occurs in man, and the process above described consists in fatty degeneration of the cells. The affection is much more commonly met with in the peripheral portions of the fundus beyond the equatorial region than in the central parts. This is true also of disseminated choroiditis, which may be regarded as a repetition of the above changes in many positions. Finally by the rupture of the cell and the proliferation of the oil globules, the pigment is set free, either in the midst of the fatty mass, or is driven by it into new situations. Later than this proliferation ceases, and a retrograde change occurs. The pigment granules cannot undergo absorption, however, and there is nothing to prevent their migration.

M. Morano insists on the great probability that the pigmentary layer of the choroid really belongs to the retina. He has, by a series of very excellent preparations, demonstrated that the pigment epithelium is provided with processes which insinuate themselves between the rods and cones of Jacob's membrane, and reach as far as the external limiting membrane, and even the granular layer of the rods. The epithelial cells, in fact, are not really of the pavement type, but rather cylindrical.

The pigment having once reached Jacob's membrane may be arrested there and accumulate. For this to occur it is necessary that the layer of rods should be unaffected. Generally this is not the case. After the pigmentary granules have formed groups more or less rounded, it not unfrequently happens that the black colour of the latter becomes less intense; they become scattered, and in the centre are swollen, greyish, indistinct, or even opaque. The granules re-collect at the margin of the patches, and form circles more or less complete. The centre of a circle instead of being depressed stands out in relief and is of a dirty grey colour, which soon fades in its turn. The greyish patch becomes covered with numerous small capillary vessels, as if a tumour were developing, or rather as if adhesion were occurring between the layer of rods of the retina and the capillary layer of the choroid. Soon a retrograde change occurs again. The vessels disappear, the colour fades and becomes of a pearly lustre, but through the patch can be seen faintly other vessels more deeply placed. These prove to be the vasa vorticosa, and the pearly appearance is due to the sclerotic. Finally the vasa vorticosa atrophy and only exposed sclerotic remains.

Four stages in the progress of a case of circumscribed choroiditis may be defined:—1. One of hyperæmia and local congestion. 2. One of exudation and fatty degeneration. 3. One of pigmentation. 4. One of atrophy.

The subjective symptom first noticed is that of a musca, fixed in position, but altering in shape, and sometimes scarcely noticed.

Later intolerance of any change from a dull to a brighter light is complained of, and the flame of a candle appears to have rays like the tail of a comet passing away from it. Pain more or less intense is complained of in the eye, and the globe is tender to the touch at one spot. Finally the musca becomes a true scotoma.

The causes of the disease are obscure. In no case has the author demonstrated the presence of syphilis. Habitual constipation, suppression or irregularity of menstruation, cessation of bleeding from piles, chlorosis, and myopia, are often associated with the affection.

The course of the disease is sometimes rapid or acute, sometimes chronic. In one of the cases the affection passed through its various stages in a few weeks, but in the majority the duration was three months or more. There is no tendency to improvement without treatment. The author relies chiefly on leeching (artificial) to the temple followed by seclusion in a dark chamber. A second remedy is friction with strong mercurial ointment on various parts of the body; a third in the use of biniodide of mercury and iodide of potassium; and, lastly, the employment of flying blisters to the forehead and temple.

Case 1.—The patient was a vigorous adult male, æt. 36, who had always had excellent health. He was much exposed to strong light in photographic work. Six years previously he had had a severe attack of photophobia, during which he had to keep in the dark. Twenty-five leeches were applied round the anus, and he took a grain of quinine daily. He recovered in about a month. He had had repeated attacks since that time. His last attack had existed three weeks. At the upper and inner part of the eyeball pressure gave pain, and the ophthalmoscope demonstrated the presence of a patch of a deep reddish-brown colour at the upper and inner part of the fundus rather beyond the equator. The artificial leech was applied, purgatives administered, and absolute rest of the eyes enjoined. At the end of eighteen days all the symptoms had disappeared.

Case 2.—Patient a robust female, aged 34. Three years previously she had noticed a musca. For three or four weeks frontal pain had been noticed, and for a fortnight intense photophobia. A spot on the upper and outer part of the eyeball was sensitive to the touch; there was a large scotoma, whilst, in the dark, numerous flashes of light were complained of. At the upper and outer part of the fundus midway between the ora serrata and the equator was a series of whitish or yellowish-white rounded spots. They were arranged in a curve with the concavity inwards. Each was surrounded with a narrow reddish-yellow margin, contrasting strongly with the red tint of surrounding parts. There appeared to be slight œdema of the retina. A similar treatment to that of the previous case was followed by some improvement. In twelve days mercury and iodide of potassium were ordered. At

the end of a week a notable improvement had resulted. The patient, who could not read any letters before, read No. 8 J. In another week she could read No. 3 J.

Case 3.—A man, aged 26, of fair complexion, pale, myopic. He had a central scotoma, which at a distance of two feet covered a two-franc piece. The affection had been noticed for a fortnight or three weeks. The ophthalmoscope showed a posterior staphyloma, and at the yellow spot a reddish-brown granular patch, about four-fifths of the diameter of the optic disc in width, having its margin more deeply tinted and irregularly dentated. There were a few dots of pigment. The retina was distinctly but slightly elevated. The ophthalmoscopic examination gave great pain. During the progress of the case (given at length), in spite of treatment and some temporary amelioration, the disease passed on to atrophy of the choroid with impairment of the retinal bacillary layer.

Case 4.—A man, aged 28, vigorous, in good health. He had divergent strabismus of the left eye. He applied on account of a recent defect of the other eye due to cataract. In the left eye, defective from the age of 12, a large patch of atrophied choroïd was found in the region of the yellow spot. The appearances are given at length.

Case 5.—A female, aged 25, chlorotic, suffering from dysmenorrhœa, headache, constipation, &c. Two years previously she had suffered from symptoms analogous to those in Case 2, and was treated by Dr. Sichel (père), whose treatment was followed by amelioration. When examined at the time of her second appearance (end of two years) a patch of white such as previously described was found at the macula lutea, measuring about five times the diameter of the disc. Above the latter was another patch, measuring about twice the size of the disc and with two prolongations like tongues of flame. After the administration of tonics vision improved. A portrait of the conditions will appear in the Supplement to the "Iconographie."

Case 6.—The patient, a male, aged 42, of large build and sanguine temperament, had noticed the defect for a fortnight. For two days he had been obliged to give up work. He was myopic. The region of the optic disc was hazy and staphylomatous. In the extreme periphery, inferiorly, was a group of small spots of a greyish-white colour, and eight or ten in number. They were slightly elevated. The artificial leech was applied, and iodide of mercury and potassium given internally. At the end of two months he could spell 12 J., whereas he had not been able to distinguish a character. The peripheral spots had become brilliant white (sclerotic). Two of them were encircled in a ring of pigment.—("Annales d'Oculistique," March—April, 1872, pp. 129—156.)

EXTRACTION OF CATARACT WITHOUT OPENING THE CAPSULE OF THE LENS.

Dr. Hermann Pagenstecher, of Wiesbaden, writes on this subject in the "Annales d'Oculistique," September—October, 1871, p. 126. Some years ago his brother, Dr. Alexander Pagenstecher, published the results of sixty-three cases. Since that time 140 cases have been treated, and the lessons derived from them are as follow:—

In many respects the conclusions formerly arrived at have been confirmed, but it has gradually become evident that the method is more adapted for certain kinds of cataract than for others. The slight resistance offered in a certain number of cases by the capsule, or its firm union with the zonule of Zinn, would prevent the plan being generally adopted. On the other hand, it would appear to be particularly adapted to those cases in which the resistance offered by the capsule was greater in proportion than that between it and the zonule. Under this category would come nearly all cases of senile cataract, whether hard and undergoing degeneration or soft, and also those in which, after a slow development of the opacities, certain portions of the cortical substance have remained transparent, and the cataracts would never become wholly mature. These cataracts are, generally, of no large size, and the union of the zonule to the capsule offers very little resistance. Very often the cortical layers have undergone degeneration, and the cataract has a flattened form. Dr. Pagenstecher has often examined such cataracts immediately after extraction, and has ascertained that the cortical substance shows very little opacity. Generally a very slender belt is formed around a very large and opaque nucleus. The fibres of the cortex appeared separated, and the most transparent parts showed evidences of fatty and myeloid degeneration. The opacities visible to the naked eye were caused by accumulations of drops of oil of a myeloid substance and of fibres in the course of destruction. In the nucleus itself were fibrils which were opaque certainly, but which were in a normal situation and of normal size. The epithelium of the anterior capsule was generally in good preservation. In a few cases it was completely destroyed; in others it had undergone changes. Between the normal cells had become developed others two or three times as large, generally round, and containing two or three nuclei. This condition had resulted from the fusion of two or three cells into one. The third group of cataracts adapted for removal without opening the capsule, comprises those consequent on irido-choroiditis or iritis, and in connection with circular posterior synechiæ. In these cases it is necessary to overcome the adhesions between the capsule and the iris. This is accomplished by using a small silver hook with a blunt point. A fourth group consists of the

cases in which cataract coexists with irido-donesis. This phenomenon may be caused either by degeneration of the lens or by diminution of the bulk of the vitreous. The latter condition almost always presupposes atrophy of the zonule. In the last two classes of cases it is especially important to preserve the iris from the irritation of *débris* of the capsule or of lens matter, because of the tendency to inflammation, and therefore the operation of removal of the lens in its capsule is very appropriate. Lastly, cases are occasionally met with in which, during the operation, before the capsule is opened, an escape of vitreous occurs. On all occasions, therefore, even when it is intended to open the capsule, an operator should be prepared to use a scoop. As the indications as to the kind of cases adapted for the operation have undergone modifications, so have the operative procedures. Instead of cutting a flap, a linear incision upwards with a free iridectomy is practised. In a few cases it happens that after this has been done very slight pressure on the lower border of the cornea causes the lens enclosed in its capsule to present at once, and the extraction can be accomplished without further trouble. In the greater number of cases a special kind of scoop, made by Weiss and Son, is employed. This scoop is introduced carefully behind the equator of the lens, and then gently passed over its posterior surface till it touches the lower border. In order to facilitate this manœuvre gentle pressure can be employed over the inferior border of the lens, and thus its superior border be tilted forwards. After a slight rotation, produced by a change in the direction of the spoon, so that its handle is carried from the middle of the wound towards the internal angle, the lens is drawn upwards. At the same time the handle of the spoon is depressed towards the margin of the orbit. The slight pressure of the lens which occurs against the cornea prevents its slipping from the concavity of the spoon. The extraction is further much assisted by gentle pressure on the lower border of the cornea with a curette made of caoutchouc combined with a slight movement from below upwards. Chloroform is only used at the patient's special request, as it has not been found necessary since the employment of Graefe's incision with iridectomy. The escape of vitreous also much less frequently occurs, and, when it does occur, it is to a slighter degree, The after-treatment is the same as after other methods of extraction. The advantages of the operation are summarised as follow :—There is no tendency to iritis. In 200 cases iritis has not occurred, primarily, in one. No secondary operation is requisite. The vision is more acute than after any other procedure. In twelve per cent. the acuteness is normal. The number of failures is not greater than after ordinary linear extraction. The defects of the operation are the difficulty which is met with in performing it and of making an exact diagnosis

as to its advisability. Escape of vitreous has never been a source of failure. The anterior part of the vitreous sometimes becomes opaque after the operation, but this is not very prejudicial, because the affection soon passes off; its intensity is not in accord with the amount of vitreous lost. It has been frequently observed that after the loss of a considerable quantity of too fluid vitreous, the remaining vitreous has continued quite transparent.

EXTRACTION OF CATARACT.

In a letter written by Dr. Mazzei, of Florence, and communicated to the "Annales d'Oculistique," September—October, 1871, are some remarks on the various methods employed for the extraction of cataract and a description of a new method. The knife used resembles that known as Graefe's, but is not of the same size. Instead of the length being 30 mm. (an inch and a fifth), it is reduced to 24 mm. (·96 inch), whilst the breadth is 3 mm. (·12 inch) instead of $1\frac{1}{2}$ mm. (·06 inch). The thickness is the same in the two instruments. The patient having been placed on the couch, and the eye which is not to be operated on being covered with a bandage, an assistant raises the upper eyelid, taking care not to lift it too much. The operator steadies the eyeball with the index and middle fingers of the left or of the right hand, according to the side operated on. The knife is then thrust into the sclerotic at the lower third of the sclero-corneal margin, taking care to direct the point of the knife, at first, towards the centre of the pupil, that is, at an angle of 40 degrees with the tangent of the lower curve of the cornea. The blade is pushed on, in the same direction, until its widest part enters the wound, when the direction is altered to one parallel with the inferior tangent of the cornea, that is, the knife is placed horizontally and a counter-puncture made on the opposite side opposite the point at which the knife was entered. Hitherto the edge of the knife has been directed downwards, but at this stage it is turned forwards at an angle of 45 or 50 degrees, and the incision is completed by a slight sawing movement of the knife. The capsule is then opened and an attempt made to extract the cataract by pressing lightly with a curette below the wound and with the assistance of the thumb of the other hand. Patients behave much better at this stage of the operation than when any other plan is adopted, because they have not been annoyed by the use of elevators or of forceps to fix the globe. If the lens does not come out easily, or if a portion of iris becomes entangled in the edges of the wound, iridectomy is practised, and this is also had recourse to if the opening in the cornea has not been made large enough. If the situation of the counter-

puncture be carefully attended to, the corneal opening can always be made of sufficient extent.

The after-treatment is simple. Six hours after the operation atropine is used and a compressive bandage applied and changed every twelve hours, the drops being used each time. At the end of three days, if all has gone well, the bandage is left off. The atropine is continued for twelve days. If the result is not favourable, each case must be treated on its own merits. For the first three days the patient's diet is restricted and he is kept in bed. The following advantages are claimed:—1. Simplification of the operation. 2. Preservation, almost invariably, of the integrity of the iris. 3. Less constraint and pain suffered by the patient, as the lids are not forcibly separated by a speculum. To these may be added the fact, that after this operation the area of the pupil is less often obstructed by opaque capsule. If chloroform is used, of course the patient feels no pain whichever plan is adopted; but at Boulogne they never use anæsthetics, so that it is important to make the operative procedures as painless as possible.

THE CONDITION OF VISION IN VERY YOUNG INFANTS.

Dr. L. Cuignet gives the results of his observations on the vision possessed by young infants. He thinks that the function of sight is progressive, being only imperfectly exercised for some months, and that the eye is very susceptible to light, this susceptibility passing off very slowly. He has carefully experimented on two infants. The whole of the first day after birth was passed in uninterrupted sleep. The second day the baby opened its eyelids, but shut them and began to blink on exposure to the light from a window, but again opened them and looked about when its face was turned from the light. If he were exposed to a moderate light he would open first one eye and then the other. If both were open he squinted with one, more frequently the left (convergent squint). On the sixth day he seemed annoyed by prolonged removal from the light, and would be quite still if a candle were lit and thus surrounding objects dimly seen. On the eighth day his sleep became interrupted by intervals of half-an-hour or an hour, during which he seemed to look steadily at objects with an air of consciousness. It seemed evident that his intellect was beginning to be developed, for his hands moved towards an object at which he was looking as if with a confused intention of touching it. Daylight still compelled him to shut his eyes. When a lighted candle was held at a distance of from six to nine feet he would look at it steadily; if the candle were brought nearer (at two feet or one and a half, or one foot) he squinted extremely, and in spite of his wish to look at the flame, which pleased him, he was obliged after a while to close his eyes.

There was photophobia therefore, inducing a squint in order to remove one eye from the light. On the twentieth day the baby could open its eyes better and look about by rolling the eyes without moving the head, but its look had neither expression nor precise intention. It always feared a full light and squinted strongly when exposed to it. It slept more in the daytime than at night, probably because of the susceptibility of the sight and the rapid fatigue which resulted even from a short exercise of the power of vision, forcing it to close its eyes and yield to the torpor due to the absence of all sensorial impression. He would remain awake for a long time at dawn, and in the twilight would stir himself, cry out, and look about him and stretch his hands out towards objects which he perceived. It was suspected that his range of vision was limited and that he could not see with the peripheral portions of the retina, that is, that he could only see for a short distance and straight before him. As he already took some notice of the flame of a candle, an attempt was made to confirm the above suspicion. It was found that in a dimly lighted room he would look attentively at a candle held before him at a distance of from three to six feet, but if this were suddenly moved a yard in any direction he ceased to see it and looked vaguely in other directions. If he happened accidentally to look in the right direction he would then "fix" anew, or if the candle were brought back to its original position he saw it again. He lost sight of the candle in whatever direction it was moved, even though its position had been but slightly altered. Moreover, when the candle was moved to a distance of nine, twelve, or eighteen feet straight in front of him, the baby could not see it. If it were brought back to a distance of six or nine feet he again saw it. If the candle were brought nearer (eighteen inches or less) convergent strabismus, winking, and finally closure of the eyelids followed. It would appear that the state of the vision is in accordance with the state of cerebral development; that the infant has, from its birth, a very marked power of convergence, which is the principal agent in the production of permanent strabismus at the same time that the excessive sensitiveness of the retina is its primary cause. It is to be added that when this sensitiveness is continually excited by an abnormal condition of ocular refraction, hypermetropia (much more common in the young than myopia), the photophobic convergent strabismus becomes very manifest and remains permanently.

On the twenty-eighth day after birth it was noted that the baby desired to be carried about whilst awake, and would remain awake for an hour or two, and would look about with some sort of curiosity, unless it was exposed to strong daylight or sun light. It opened its eyes widely and did not blink. On the thirty-sixth day he was taken out of doors, and could bear the light. If, however, he looked at a light which was close to him,

or even at any object closely, he still squinted. He did not recognise any one by sight, it did not matter to him who took him and carried him about, but he knew his mother's voice. It was not till the sixtieth day that it was certain that he recognised his mother by sight. He would look at her attentively and smile at her, but not at any one else, and he did not like strangers. It pleased him to see the large flowers on a curtain and to be carried about in a well-lighted passage. At the age of two and a-half months he could not "fix" an object at twenty feet distance, and all attempts to attract his attention by a light held on one side were unavailing. If a noise were made on one side of him, he would attempt to turn his eyes and his head to that side. At the age of three and a-half months it was evident that he had a larger field, and he would watch the movements of his brothers playing at a considerable distance.

At the age of four months it was still evident that his sight was not fully developed either in a direction straight before him or laterally.

One means, amongst others, adopted to test this was, to attract the child's attention while he was seated on his mother's arm, and get him to look at some one stationed behind his mother, the child looking on one side of his mother's head.

If then the person behind moved to the other side, the child lost sight of him, though the actual lateral movement was very slight. It was not till the age of five months that the field of vision seemed nearly normal. He now seemed to have sufficient muscular power to hold his head up and turn it wherever he wished. At six months it seemed quite evident that he could see widely and at a great distance.

There was no photophobia. Parents and nurses often say that squints have been caused by exposing babies in their cradles to too strong a light, but the permanent squint is generally not observed till the age of one or two years, and hypermetropia is generally present. — ("Annales d'Oculistique," September—October, 1871, p. 117.)

EMPHYSEMA OF THE EYELIDS, &c.

Dr. Gruening relates two cases in which after blows on the forehead, violent blowing of the nose, was followed by emphysema. In one case the eyelids and the orbit were emphysematous, and one eyeball protruded. In the other, only the eyelids and adjacent parts were affected. The first case was lost sight of. The second recovered quickly. The treatment consisted in compression, and a recommendation for the patient to abstain from blowing his nose. In the first case probably a fracture had implicated the posterior portion of the inner wall of the orbit—the os planum of the ethmoid. In the second, probably the fracture

was further forwards.—(Archives of Ophthal. and Otol., 1871, p. 184.)

THE LIGHT-STREAK SEEN IN THE CENTRE OF THE RETINAL VESSELS WITH THE OPHTHALMOSCOPE.

Dr. Loring believes that the co-called double contour of the retinal arteries as seen with the ophthalmoscope, depends on the transmission of light reflected from the fundus through the centre of the vessel, not on the reflection of light from the surface of the vessel. The light striking the wall of the vessel nearest the observer passes through this, on account of its transparency, without being reflected to an appreciable degree; traverses the contents of the vessel, and is then reflected back, slightly from the opposite wall, but principally from the subjacent tissues. The condition of the latter determines the presence or absence of the light streak. His belief is founded on the following data. The light streak is too broad to be a simple reflection from the vertex of a curved surface, whether of the wall of a vessel or of its blood column, as Jaeger supposes. The column of blood is too transparent and too reflecting to give so brilliant a streak. The light streak ought always to be present as long as the vessels remain full, and the fuller they are the denser the column of blood and the greater the reflexion. If venous pulse be present, the light streak will be seen to appear when the vein is empty, and to disappear when the vein is full.

If the retina be detached, the light streak disappears at the point of commencement of the detachment. If a glass tube filled with a red fluid be placed in front of a reflector situated at the bottom of a cylinder lined with black, and then light thrown in with an ophthalmoscopic mirror, the centre of the red tube will appear of a light colour, while the border above and below will be dark. If the reflector be perforated in one place, the whole width of the tube at this spot will be of a uniform colour. So also if the tube be placed over a non-reflecting surface, the tint will be uniform. This would not happen if the phenomenon of the light-streak depended on the vessel (or tube) itself.—(Archives of Ophthal. and Otol., 1871, p. 95.)

INJURIES OF THE EYEBALL, &c.

Dr. Aub narrates cases of injuries of the eyeball and its surroundings.

Foreign body behind the Eyeball.—One patient, a man, aged 24, had been struck by a "spike" discharged from an air gun. Those who were present declared that the spike came out again from the eye. There was a wound of the cornea, and the eye

was utterly lost. Some "woollen" fibres were detected in the collapsed eyeball and occasionally were present in the purulent discharge. After three weeks an opening in the conjunctiva was made, and a foreign body, at one end of which was a cast-steel point and at the other some woollen fibres was removed from behind the eyeball. Its total length was eight-tenths of an inch. The projectile must have pierced the whole eyeball and lodged with its point in the orbit, the posterior scleral wound being filled up by the end of the woollen fibres. As suppuration progressed and the eyeball shrank, the scleral wounds became closed and the pus formed an exit through the conjunctiva, pushing the eyeball aside. The patient ultimately had a very good stump which bore an artificial eye well.

A case of *suppurative choroiditis* is mentioned in which a piece of steel having penetrated the eyeball, worked its way out gradually in the course of about a week, and was removed with forceps from a swelling over the external rectus muscle. An ulcer of the cornea and hypopyon which were present gradually diminished, and finally vision $= \frac{2}{7}\frac{0}{0}$, and $1\frac{1}{2}$ (J.) at 10″.

Rupture of the Choroid, Central and Peripheral, &c.—An interesting case of rupture of the choroid is given. A lad, aged 14, was struck in the eye by a piece of wood. An opacity of the posterior part of the lens and dense opacity of the vitreous were early symptoms. The opacity of the lens was considered to be due to rupture of the posterior capsule. At the end of a fortnight the outer half of the optic disc was seen covered with blood clot, and there was another clot between it and the yellow spot, and at the yellow spot there was a third. At the anterior and outer part of the fundus, at the junction of the choroid proper, with the ciliary portion of the uveal tract, a gap was seen extending upwards and backwards, and its borders were lined with pigment. As the fundus cleared a branching rupture of the choroid was visible at the yellow spot, and a white atrophic patch was left where the blood clot had been between the latter and the optic disc. "This case is of special interest, since it is the only one on record in which a simultaneous rupture of the choroid at the macula lutea and at the periphery existed. That the choroid and retina were torn at the ora serrata is proven by the fact that the choroidal hæmorrhage escaped freely into the vitreous and left no blood collected between the choroid and retina." The peripheral rupture was probably direct, the central one the effect of contre-coup. The ultimate result was a slight amount of vision in the lower and outer portion of the field.

A case of *dislocation of the lens into the vitreous with preservation of good sight* is narrated. Also a case of *gunshot injury to the eyeball without marked lesion, with remarkable disturbance of sight and perfect recovery.* The position of the lens was suspected to have been altered, but was not considered to account for the

whole of the symptoms.—(Archives of Ophthal. and Otol., 1871, p. 187.)

IRIDECTOMY WITHOUT DIVISION OF THE SPHINCTER PUPILLÆ.

B. A. Pope advocates the performance of iridectomy without dividing the sphincter pupillæ. He thinks this advisable in cases in which there is a central opacity of the cornea, and in which there has been some inflammation of the eye; in cases in which there has been perforation of the cornea with prolapse of the iris; in those in which there is diffused corneal opacity, most marked centrally together with iritis or irido-choroiditis, with or without iritic adhesions, and in cases in which an extremely eccentric pupil may be required and internal disease may exist. The double pupil which results has not been followed by any inconvenience.—(Archives of Ophthal. and Otol., 1871, p. 87.)

PARALYSIS OF ACCOMMODATION.

Dr. Colsman relates ten cases of paralysis of accommodation, coming on suddenly and gradually, followed by recovery. Three of the patients were adults, in whom the affection had come on after over-use of the eye. In one case, that of a child, the paralysis followed measles. In two children it followed sore throat. In one adult no cause could be assigned. In two cases syphilis was the cause; and in one it followed after an attack of herpes zoster frontalis.—(Archives of Ophthal. and Otol., 1871, p. 154.)

CONICAL CORNEA.

Dr. Steinheim narrates three cases of conical cornea in which Graefe's operation was followed by satisfactory results. The first patient, a man, aged 21, read only 3 and 4 (J.) at a distance of three-quarters of an inch or an inch. Six months after the operation he read 1 (J.) at five inches. His distant vision $= \frac{20}{50}$. The second patient was a man, aged 37. He read 6 (J.) at $1\frac{1}{2}''$, and counted fingers at four feet. Afterwards he read 1 (J.) at 2″, and with $-4\frac{1}{2}''$ his vision $= \frac{1}{10}$. The third patient was a man. With the right eye he could read 3 (J.) at $\frac{3}{4}''$. The largest type could not be seen further off than 3″. With the left eye he read 4 (J.) at $\frac{3}{4}''$, and could count fingers at two feet. The eye was operated on, and at the end of the eighth week he could count fingers at seven or eight feet, and with $-4\frac{1}{2}''$ as far as eighteen feet. He could read No. 1 (J.) at 4″, and with $-4\frac{1}{2}''$ his vision $= \frac{16}{200}$.

Dr. Steinheim attaches especial importance to the establishing

of a fistula for some time, and of encouraging a thinning of the base of the ulcer which is formed over a considerable extent. —(Archives of Ophthal. and Otol., 1871, p. 166.)

SYMPATHETIC OPHTHALMIA WITH NEURO-RETINITIS.

Dr. Pooley narrates two cases in which neuro-retinitis occurred in eyes sympathetically affected. The first case was that of a boy, aged 9 years. One eye was injured July 27th, 1869. The other became inflamed August 24th. On October 11th, though the vitreous was somewhat hazy, the optic disc could be seen. The vessels were tortuous and the disc was covered with exudation. The fundus became more obscured, and very little sight was ultimately left. An account of the microscopical appearances of the injured eyeball which was removed is given. The second patient was a man, aged 59. At the age of 19 one eye was injured, and was liable to attacks of inflammation. Four months before his admission he again injured the eye. Three weeks previously a "fog" had appeared before the other eye. Hyperæmia of the optic disc, uniform and semi-transparent exudation on and around the disc, the borders of which were completely concealed, were found. The injured eye was enucleated, and the vision of the other eye ultimately improved to $\frac{20}{30}$. An account of the examination of the injured eyeball is given.—(Archives of Ophthal. and Otol., 1871, p. 284.)

PTERYGIUM SUPERIUS.

Prof. Knapp says that he had never seen a case of superior pterygium till lately. After an epidemic of ophthalmia among a number of children two were affected with this malady. He operated on one. The patient was a girl, 11 years of age, whose left eye presented a well-developed, rather thick and vascular pterygium. Its basis was connected with the whole superior reflexion of the conjunctiva, while its apex overlapped the cornea so far as to cover the pupil entirely. A probe could be passed beneath it. It was detached from the cornea with a cataract knife, and it then shrank up, leaving a zone of healthy conjunctiva between the cornea and the base of attachment. It was, therefore, left without any further interference, and in a fortnight the mass had almost entirely disappeared. There was a central adherent leucoma of the cornea. The pterygium is formed while the cornea and conjunctiva are ulcerated, and the lids remain closed for some days. It seems surprising that such a condition does not result oftener, but probably the adhesions separate spontaneously. In the other case the pterygium did disappear spontaneously.—(Archives of Ophthal. and Otol., 1871, p. 54.)

GLIOMA OF THE RETINA.

Prof. Knapp gives a very detailed account of a case of glioma of the retina in the Archives of Ophthalmology and Otology, pp. 36—51, 1871. The origin of the growth was found in small, more or less circumscribed clusters, lying in the inner granular layer of the retina. These clusters were the most luxuriant part of the new growth, and extended in every direction, but principally towards and beyond the outer granular layer. In many places the outer granular layer was the seat of the proliferating elements, while the other retinal strata were exempt from them. At other points the inner layers of the retina were filled with glioma cells, which entered through the limitans interna into the vitreous; the main bulk, however, springing from clusters situated in the inner granular layer. Prof. Knapp calls particular attention to a fact which puzzled him much at first, that the outermost layers of the tumour forming its outer smooth surface, were unmistakably the inner layers of the retina. This is illustrated by figures. The whole growth, with the exception of one point, was enveloped by the detached retina. The limitans interna forming the surface of the new growth was in contact with the limitans interna of the enveloping retina, or separated from it by a free space filled with fluid.

TUMOURS OF THE RETINA.

Dr. Francis Delafield, of New York, narrates five cases of tumour of the retina. The first specimen was taken from a girl, aged 18 months. Her father had noticed a white spot in the pupil three months previously. There was no return of the disease at the end of two months after the operation, but the patient was then lost sight of. In the second case the patient was a child aged four. The disease had been noticed for two years. The child died in a year after the enucleation. The third patient was a girl four years old. Ten months previously the eye became red and painful, and the pupil had a greenish aspect. Six months before removal of the eye a tumour, the size of a pea, could be made out by the ophthalmoscope in the outer portion of the fundus. Within four months after the extirpation a tumour appeared in the orbit, and a few months later the child died. A tumour was found in the brain at the optic chiasma. In the fourth case the patient was a boy two years old. An opacity in the pupil was noticed one year before enucleation. Within four months vision was destroyed, and the eyeball began to protrude. A tumour situated in the upper and outer part of the orbit, and attached to the globe, was removed with it. One month after removal a growth appeared in the orbit. Soon afterwards the

sight of the other eye was lost, there was hemiplegia, marked evidences of cerebral disease, and the child died in a short time. In the last case the patient was a girl two and a-half years of age. Six months before the enucleation it was noticed that the pupil was enlarged. Six weeks later the tumour recurred in the orbit, and afterwards growths appeared on the temples and in the inferior maxilla; the vision of the other eye was lost, and death followed in three months after the operation. Four of the specimens showed the methods by which the new growth spreads from the retina to the neighbouring parts. The choroid, optic nerve, episcleral tissue, sclera, brain, and periosteum of the cranial bones became the seats of secondary tumours. The optic nerve was involved, and presented similar changes in each. The bundles of nerve fibres had disappeared, and were replaced by round cells. The fibrous septa remained unaltered. The cells formed a continuous growth with the retinal tumour. The two sheaths of the nerve were very little altered in any of the cases, and in only one were there cells between the two. Most authors describe the new growth as advancing along the fibrous septa and sheath of the nerve, leaving the nerve bundles untouched to the last. In the choroid the secondary tumours occurred by discontinuous infection. Separate foci were formed beneath the epithelium and in the stroma. In the sclera the secondary tumours were small, and formed of aggregation of cells separating the fibrous tissue. The tumours outside the sclera were in two cases of large size. In one case tumours grew from the periosteum of the cranial bones. The following conclusions are arrived at:— 1. The rule laid down by Hirschberg, that retinal tumours grow outwards towards the choroid has many exceptions. 2. The elements of these tumours only resemble the granules of the retina as when altered by reagents and seen with low powers. When examined fresh, and with high powers, they are seen to be identical with the so-called lymphoid cells which compose so many new growths. 3. If we dismiss from our minds the superficial resemblance between the elements of these tumours and the retinal granules, they at once take their place in the class of round-celled medullary sarcoma. 4. The variation in the size of the cell-body and in the proportion of stroma in different parts of these tumours, is almost always found. This variation is the same which we find in most sarcomata, and is no reason why we should speak of a tumour as beginning as a glioma, and then becoming sarcomatous. 5. Not only the anatomy, but also the clinical history of retinal tumours corresponds exactly with those of the medullary sarcomata. 6. The development of secondary tumours follows the rule laid down by Virchow for sarcomata; and occurs (1.) By continuous infection of the retina, optic nerve, and perhaps the brain; (2.) By discontinuous infection forming the choroid, scleral, and episcleral tumours; (3.) By

metastasis proper, forming tumours on the bones, lymphatic glands, and liver.—(Archives Ophthal. and Otol., 1871, p. 58.)

STATISTICAL REPORT OF DR. WECKER'S CLINIQUE.

This Report refers to the half-year, July–December, 1871, and was drawn up by Georges Martin.

Operations for Cataract.—These were 95 in number; 86 of spontaneous origin, 5 were traumatic, and 4 congenital. Excepting the latter, all were operated on by Graefe's method, modified in two particulars, as to the sclerotic section, and as to the opening of the capsule.

The sclerotic section was made as follows: the points of puncture and of counter-puncture were situated in the sclerotic at the distance of one millimetre (·04″) outside the corneal margin at the level of a horizontal line passing two mm. (·08″) below the upper border of the cornea, the instrument cutting its way out at the level of the upper corneal margin.

By this procedure a small flap was formed, of which the apex corresponded exactly with the upper border of the cornea, and whose base, situated two millimetres (·08″) lower, included the whole breadth of the cornea, at that level, with two millimetres in addition taken from the sclerotic (one on each side). With a cornea 12 mm. (·48″) in diameter, a flap of the width of 11 or 11½ mm. would be obtained, whilst Graefe's plan would only yield one of 10 or 10½ mm. Graefe insisted that any height of flap if exceeding one millimetre was superfluous and exposed to certain dangers. It is asserted however, that the dangers of an operation do not depend on the opening being too large, but on its being too small. The increase in the extent of the section does not necessitate a large coloboma of the iris. This can be avoided by not making much traction on the iris before applying the scissors, and if there is any tendency for the iris to prolapse by making pressure with the convex part of the curette on the globe from above downwards. The section above described gives a larger opening, which facilitates the removal of incomplete cataracts; it is easier for the operator to perform; it is easier to follow the directions exactly by this plan than by that of Graefe, and they need not be departed from in particular cases as so often occurs in the ordinary procedure.

An operator finds less difficulty in making his point of puncture in an imaginary horizontal line at a level of two millimetres below the border of the cornea than a millimetre below a horizontal line forming the tangent to the summit of the cornea. M. Wecker's modified plan applies to all individual varieties, whereas the procedure called "peripheral," demands in some sort a special study of each case. In hard cataracts and those of large size, it is necessary to make the puncture and counter-

puncture lower, and this is also necessary if the cornea is less than 12 millimetres in diameter.

The second modification adopted belongs to the third stage of the operation. Instead of simply lacerating the capsule, M. Wecker cuts out a quadrangular flap. He uses a pair of iridectomy forceps curved, or bent at an angle, and furnished at the extremities of each branch on a level with the teeth on the inner side, with a small triangular cutting blade. A figure of them is given.

These cystitome-forceps are introduced closed, and passed as far as the lower border of the pupil; they are then directed so that the triangular extremities shall touch the capsule, and the points are separated on a level with the lower border of the pupil, to a distance of about 4 mm. (·16″), the capsule being lacerated at the same time. While the points are still separated, the instrument is drawn from below upwards parallel to the border of the artificial pupil, the capsule being lacerated all the time. When the points reach the level of the upper border of the lens, they are closed so as to grasp the flap of the capsule, and the forceps are then withdrawn closed as an ordinary cystitome. The instrument has the advantage of combining two instruments in one, and it is not a new one, the management of which requires an apprenticeship. The extremities of the cut iris should always be replaced before the capsule is lacerated, for it is much more difficult to do this after the extraction of the lens. If a flap of capsule be not always extracted, at any rate with this instrument a very considerable laceration of it is effected.

The mode of dressing adopted has been slightly modified. The eye having been washed and dried, both eyes are covered with pieces of fine linen, over which layers of unglazed wadding are applied, so as to fill up the hollow in front of the eye, and finally, a flannel bandage for both eyes, retains the dressing, exercises slight pressure on the globes, and fixes the eyelids. On the evening of the operation, a dose of chloral is given. The next day, at the first change of dressing, if the pupil is free from cuticle substance and sufficiently dilated, no atropine is used. It is only resorted to when the aqueous seems discoloured, contains cuticle matter, and the iris threatens to become inflamed. The results of the 86 extractions are given in a table seriatim. The following remarks are made:—In fourteen instances, the cataracts were immature. The patients were unable to read, but the opacity was so little advanced, that the cataracts would not have been "ripe" for 12, 15, or 18 months longer. M. Wecker operated when both cataracts were simultaneously advanced, so that the patients were unable to read or follow any occupation. It was important to make a large sclerotic section. The lens presented easily, and was preceded and followed by transparent cuticle substance. Measurement of nuclei

so extracted show that they are sometimes superior and sometimes inferior in size to the average of mature ones. The largest were the most immature; the smallest were more advanced, but still incomplete. The progress of these cases was quite without any complications, and the patients remained in hospital the average period. The acuity of vision in four cases = $\frac{2}{3}$; in four others $\frac{1}{2}$, and in the remaining six $\frac{2}{5}$. Was the fact that the acuity of vision was above the average due to the comparative youth of the patients? However that may be, the patients had they not been operated on would have remained for months or years with incomplete vision, which would have necessitated their relinquishing their operations, and the plan adopted reduced to a minimum the inconveniences of opacities of the lens.

If now we consider the general condition of those operated on, we find that four were the subjects of diabetes. One in particular was affected with a grave form of this malady. Nevertheless, these four progressed as favourably as others. In 1869 there were three cases of diabetic cataract in which a like satisfactory result followed. The only precautions necessary (if iridectomy with a peripheral section be performed) are to remove as much cortical substance as possible, and to keep up the patient's strength.

In reference to the dimensions of cataracts, the thickness seems to vary least, the average being three millimetres (·12″). The diameter of the largest equalled 10 mm. (·40″). In such as this, a sclerotic section of 11 or $11\frac{1}{2}$ mm. would be almost insufficient, for the internal section would only measure $9\frac{1}{2}$ mm.

In the whole number of eighty-six operations, in only five did any escape of vitreous occur. In one of these exophthalmos existed. The result in all of them was satisfactory. In two cases out of the eighty-six panophthalmitis followed, and in one iridochoroiditis. In one of the two former the other eye had been operated on, successfully, one week previously for mature cataract. The only predisposing cause to be suspected was the presence of a large arcus senilis, and the lens came out with some difficulty. In the second perhaps the sclerotic opening was too small. In both shrinking of the globe followed. In the third, irido-choroiditis came on, on the third day, without appreciable cause. The eye maintained its shape. In four there was slight iritis. The only result was to lengthen the patient's stay. Two patients left in four days; twenty in the first week. The average stay in hospital was a fortnight.

Of ninety-five cases operated on, failure was only met with in three, *i.e.*, 3·15 per cent. Graefe's best statistics showed a failure of 2·8 per cent. The state of vision resulting at the time the patients were tried for glasses was in four, $\frac{20}{20}$; in ten, $\frac{2}{3}$; in eighteen, $\frac{1}{2}$; in twenty-six, $\frac{2}{5}$; in ten, $\frac{2}{7}$; in four, $\frac{1}{5}$; in five, $\frac{1}{10}$. In six cases no examination was made. One patient died of pulmonary

mischief, four months after operation, without having been tried for glasses, and the others had not returned for their glasses after being sent home. Much greater acuity of vision is shown when the patients are tested a long while after extraction than when they are tried at the end of two or three weeks. It is greatly to be regretted that a uniform standard for the average acuteness to be expected is not adopted by different operators.

M. Wecker considers an acuity of less than one-fifth an incomplete result.

Iridectomy.—Sixty-one cases requiring iridectomy were operated on. Some details of them are given. Graefe's knife was used in all.

Strabotomy.—Details of fifty-three cases are given.

Sclerotomy.—This has been advocated by Quaglino, instead of iridectomy. M. Wecker has adopted a modification. Puncture and counter-puncture are made as for extraction of cataract, but on withdrawing the knife the middle third of the flap is left, as a bridge, uncut. The object is to prevent prolapse of iris. This operation has been performed seven times, with results exactly analogous to those after the ordinary iridectomy. In one case the iris became entangled at one extremity of the sclerotic wound. This operation will, however, hardly take the place of iridectomy.

Sæmisch's Operation.—In cases of ulceration of the cornea with hypopyon, the practice of iridectomy has been abandoned for the employment of the operation advocated by Sæmisch. This was performed in three cases. The cornea was incised through its whole thickness where the ulcer showed its greatest diameter. A Graefe's knife was entered a millimetre (·04″) from the margin of the ulcer, and brought out an equal distance from it on the opposite side, the cutting edge being held forwards. Before withdrawing it, slight lateral movements were made, to allow of escape of aqueous and bulging forwards of iris into the wound. For about a week afterwards the extremity of a small Weber's knife was passed daily between the edges of the wound, so as temporarily to establish a fistula.

In these three cases there was every reason to be satisfied with the method adopted. Improvement was most marked and rapid. On the second day a change had occurred; on the third it was evident the ulceration was checked. At the end of three weeks little trace of the disease remained. In three cases previously so treated a good result did not follow, but in these nearly the whole cornea was affected. For the operation to succeed, it is necessary that the ulcer occupy less than half the extent of the cornea, and therefore that the incision should not exceed the radius of the cornea.—("Annales d'Oculistique," March—April, 1872, pp. 157—186.)

THE HALO ROUND THE MACULA LUTEA.

Dr. Edward Loring has recently investigated the cause of the halo seen round the yellow spot on ophthalmoscopic examination. He thinks the explanations ordinarily given insufficient. On looking at some drawings of the macula lutea by Max Schultze, it occurred to Dr. Loring that the effect in question might be produced by the same causes within the eye that often produce it in other places in nature, or, in other words, that it might be the products of reflexion and refraction from the combination of curved surfaces which enter into the construction of this portion of the retina. The region, as figured in the diagram, bears in its formation a strong resemblance to a shallow cup, of which the rim is represented by a convex, and the bowl by a concave surface. If we look upon these curved surfaces as mirrors, they would each have their foci, one lying behind the other in front, according to their respective degrees of curvature, and, if light should be thrown perpendicularly against such a combination of curves, the apex of the outside rim or convex surface would, from well-known optical laws, appear illuminated, while the inside or concave surface would appear more or less in shadow. Thus we should have the effect of a darker centre, surrounded by an illuminated edge. Various experiments are described.—(Trans. Amer. Ophthal. Soc., 1871, p. 74.)

A scheme to aid in examining and recording cases of functional trouble of the eye, is given by Dr. Henry D. Noyes. We must refer to original paper.—(Trans. Amer. Ophthal. Soc., 1871, p. 81.)

OPERATIONS FOR SEPARATION OF POSTERIOR SYNECHIÆ.

Dr. B. Joy Jeffries reports cases in which he has successfully employed Passavant's plan of procedure. Instead of an iridectomy knife, he now uses a broad paracentesis needle. He finds no difficulty in manipulating delicate forceps in the wound thus made, and he loses but little aqueous before the iris is grasped. Atropine is continued, and the aqueous resecretes before the iris can again fasten itself to the capsule.—(Trans. Amer. Ophthal. Soc., p. 130, 1871.)

GENERAL SYPHILITIC INFLAMMATION OF THE EYE.

Dr. Delafield narrates two cases. A negro, aged 22, was treated in February for primary and secondary syphilis. In April his left eye inflamed. In October the globe projected so that the eyelids could not be closed. The eye was removed.

There was an annular staphyloma around the base of the cornea, filled with new growth involving iris, ciliary body, and choroid. The retina was detached. The second patient was a negro, aged 24. In the spring of 1869 he contracted syphilis. He was first seen in November. In the left eye there was a staphyloma of the sclerotic at the lower and inner margin of the cornea. There was bare perception of light. In the right eye there were synechiæ, &c., but he could count fingers with it. The left eye gradually protruded and was removed in March. The staphyloma and the anterior half of the globe were filled with a white mass. The iris was thickened and so were the ciliary processes. The choroid, excepting near the staphyloma, was healthy. The retina was detached funnel shaped, and its anterior was involved in the growth.—(Trans. Amer. Ophthal. Soc., 1871, p. 69.)

CASE OF PARTIAL TEMPORARY BLINDNESS.

Dr. Derby narrates the case of a married woman, aged 30, who one morning after breakfast suddenly was affected with hemiopia. All objects in the room appeared to have lost their right halves. She was seen a few minutes after the attack. No change in the fundus oculi could be detected nor any abnormality of refraction. An examination of the visual fields revealed a nearly symmetrical defect in each. They were both limited by a line running nearly vertically and close to the line of equal division. To the right of this line in both eyes the field failed. A visiting card was held at a distance of ten inches before each eye successively, and the patient directed to look fixedly at a small cross thereon. The right half appeared black. A figure is given. The affection lasted about twenty minutes and was followed by severe headache, dizziness, and nausea; the latter symptoms lasting until late in the afternoon. No further attack occurred. She said that she had repeatedly had similar attacks, which had always been followed by sick headaches. She had at times had distinct epileptiform attacks.—("The Medical Record," No. 141, p. 483. New York.)

GUNSHOT WOUND OF THE BRAIN, FOLLOWED BY FUNGUS CEREBRI AND RECOVERY WITH HEMIOPIA.

Drs. Keen and Thompson narrate the following cases:—A private, aged 23, was wounded on the occiput by a bullet. It entered in the middle line one and a quarter inches above the external occipital protuberance, and made its exit by a wound two to two and a half inches to the left of the middle line and three inches above the wound of entrance. For nine days he was not attended to. He was then conscious, but afterwards lost con-

sciousness and was more or less paralyzed in his right arm and leg. This lasted some two or three months. He had a fungus cerebri as large as his fist, which was shaved off five or six times. In four and a half months he was sent to Philadelphia and came under care. He had no paralysis, but was easily confused. His acuity of vision was good, but the "field" was found to be divided, in each eye, by a line passing through its centre in the vertical direction; total blindness existing to the right and perfect vision to the left of this line. No "blind-spot" could be detected in the right eye, but in the left it was quite evident. No ophthalmoscope changes could be detected.

Entrance of the bullet was marked by a slight depression, the wound of exit by a hollow two and a half by two inches and one inch deep. No bone had closed the opening. When recumbent, the hollow was gradually filled up and in about one minute replaced by a rounded protuberance When he coughed, considerable sudden bulging occurred. The authors of the paper remark that the complete recovery from paralysis (as evinced by his subsequent severe labour) and the almost entire restoration of his mental faculties are remarkable, especially in view of the probable deep lesion of the brain, both by the primary injury and the subsequent fungus cerebri. The astonishing and rapid changes in the state of the cranial contents are worthy of note. The light thrown on the probable anatomy of the optic commissure is worthy of notice. From the examination made of this patient's hemiopia it seemed that the fibres from the left tract supplied the left side of the retina not from the porus opticus to the ora serrata, but less than this, that is, from a point outside the porus opticus, leaving a portion of sensitive retina between the optic disc and the line of blindness and allowing of the estimation of the "blind spot." On the right side the left tract, instead of supplying only the portion of the right half of the retina from the porus opticus to the ora serrata supplied more than this, namely, from the centre of the fundus (yellow spot) outside the optic disc to the ora serrata, thus merging the "blind spot" in the general paralysis and preventing its estimation. In other words, the fibres of the left optic tract supply mathematically the left halves of the two retinæ and the right tract the right halves.

A second case occurred in a man, aged 55, disabled by partial paralysis of the left side. He had had a sunstroke seven years previously and another three years previously. The field of vision in each eye was bisected by a vertical line to the left of which there was entire blindness. No effort in this instance was made to test whether the field was limited strictly by the vertical line at the point of fixation, since the patient's intellect was not sufficiently clear.

AN ADDITIONAL METHOD FOR THE DETERMINATION OF ASTIGMATISM.

Dr. George Strawbridge suggests a ready means of detecting astigmatism. It is founded on an experiment of Helmholtz. A card resembling the one used by Dr. Green, but with long bars cut out of the cardboard instead of lines, and having a central perforation, is placed before a lamp or gas light. A central round point of light and a number of radiating bars of light are thus obtained. The patient standing at a distance of twenty feet looks at the central light. If astigmatic, he says the light is elongated in a particular direction, vertical or corresponding with one of the radiating bars. A diaphragm is now passed before his eye in the direction of the elongation of the light. The effect of this is to cut off one end of the prolongation. If the astigmatism be myopic, the elongation of the light vertical (for instance) and the diaphragm passed from above downwards the upper end of the elongated light will be cut off, whereas if the case be one of hypermetropic astigmatism the lower end would be cut off first. The *direction* of the meridian will correspond with the direction of the elongation of the light, and its amount of abnormality will be tested by trying what glass converts the elongated point of light into a circle.—(Trans. Amer. Ophthal. Soc., 1871, p. 100.)

ASTIGMATISM AS AN ACTIVE CAUSE OF MYOPIA.

Dr. John Green publishes further statistics in proof of the supposition that astigmatism frequently produces myopia.—(Trans. Amer. Ophthal. Soc., 1871, p. 105.)

REMARKS ON CATARACT.

Dr. Loring calls attention to a new mode of adapting astigmatic glasses after operations for cataract. A simple cylindrical glass of the required strength is first set in the spectacle frame in the usual way, the axis of the glass of course running in the required direction. A thin plano-convex glass is then ground and firmly fixed by its plane surface to the back or plane surface of the cylindrical glass by means of Canada balsam. The diameter of the plano-convex lens is only equal to the vertical diameter of the spectacle frame.

He also makes remarks on the want of any common standard of "success" after cataract operations. One operator taking $\frac{1}{4}$, another $\frac{1}{6}$, and another $\frac{1}{10}$ acuity of vision as "perfect result."—(Trans. Amer. Ophthal. Soc., 1871, p. 108.)

AN APPARATUS FOR TESTING THE PERCEPTION OF COLOUR.

Dr. Henry Noyes pastes on a circle of cardboard the slips of coloured paper which he uses as tests. Over this is placed an opaque disc with an aperture at one place of the size of a slip of the paper. The cardboard is then turned round till the required colour is exposed by the aperture. This apparatus can be held in any part of the "field," and the perception of that part is then registered on the black board with coloured chalks.—(Trans. Amer. Ophthal. Soc., 1871, p. 118.)

DETATCHMENT OF THE RETINA, WITH LACERATION, AT THE MACULA LUTEA.

Dr. Henry D. Noyes narrates the case of a girl, aged 16, who had been struck in the eye by the cork of a beer bottle. The accident had happened three years before. The eye had remained stationary the whole time. There was then bare perception of light. On ophthalmoscopic examination the optic disc was found normal, whilst the retina was lifted up by a stratum of fluid, which was most abundant below and to the outer side. At the middle of the fundus the retina became of a greyish-white colour, and at the "yellow spot" was a round red spot of about half the diameter of the optic disc. In the erect image this showed a distinct, reddish, granular appearance, and it was evident that the epithelium of the choroid was exposed. The surface of the retina was evidently considerably in front of the level of the choroid, and this difference in depth suggested the idea of a laceration of the retina at the "yellow spot," and that the red spot was merely a hole through which the choroid was seen. Further proof of this was obtained by the phenomena of parallax. The edge was not tremulous, nor was there any tissue sloping down from it to the spot. It was evident the observer looked under the retina. Dr. Noyes has no explanation to offer of the mechanism of this rupture. He says it is the only instance he has seen or read of. The vitreous was so transparent that it could hardly have participated in the mischief.—(Trans. Amer. Ophthal. Soc., 1871, p. 128.)

THE USE OF ATROPIA IN THE TREATMENT OF INCIPIENT STRABISMUS.

In 1870 Dr. Green narrated three cases of strabismus in which the use of atropine constituted an important aid to the treatment. He now gives the result of another year's experience. 1. In even a very young child (in one a child of three years), with commencing strabismus dependent on hypermetropia, the repeated

instillation of atropine to the point of completely suppressing accommodation leads to the speedy abandonment of the habit of squinting, and the substitution for it of a kind of scowl, having for its object the exclusion of peripheric rays of light by the partially-closed lids. 2. This suspension of accommodation allows of the acceptance of the use of glasses, and the use of glasses in return tends to postpone the return of the deviation as the effect of the mydriatic passes off. 3 By repeating the instillation as often as the squint reappears, the latter may finally be overcome. 4. These results have been obtained in three cases of periodic squint of fully three years' standing. 5. In cases of permanent deviation, in which parallelism of the visual axes no longer occurs even in perfect rest of the eyes, the effect of the treatment (whether atropia alone, or atropia conjoined with glasses) has been confined to an improvement in the position of the eyes. In such cases, however, we have in the degree of the remaining squint an important index of the actual shortening of the interni, and a guide to the extent of the correction to be sought from tenotomy.

From these statements it will be seen that the success thus far attained is limited to the preservation of binocular vision through the wearing of convex glasses. This is, however, an advantage of no small importance, when we consider how rarely we are able to restore perfect binocular vision after it has once been positively lost in consequence of the complete development of a squint.—(Trans. Amer. Ophthal. Soc., 1871, p. 136.)

CASE OF READJUSTMENT OF THE LEVATOR PALPEBRÆ.

Dr. Green narrates the following:—A boy of five years of age was gored in the left upper eyelid by a cow's horn. No other defect finally resulted than complete paralysis of the levator palpebræ. At the end of two years Dr. Green saw him. The case was then evidently one of complete detachment of the tendon of the levator, without other injury of importance. He determined on operating. An incision of rather more than an inch in length was made through the skin along the upper border of the lid, and the dissection extended through the subcutaneous tissue in a direction nearly backward, so as to avoid opening the conjunctival sac. The upper surface of the eyeball was thus reached without having encountered any fibres of the orbicularis muscle, or in fact any other tissue than the subcutaneous fat which was apparently continuous with the fat of the orbit. A broad thin tendon was seen spread out on the exposed part of the globe, which proved to be the tendon of the superior rectus. Between this and the roof of the orbit the tendon of the levator was easily discovered, and no difficulty was experienced in attaching it, by three sutures, to the front of the tarsal cartilage. The wound was then closed

by three other sutures, leaving the ends of the three deep sutures protruding externally. The superficial sutures were removed on the fourth day, the deeper ones were allowed to come away spontaneously. Two months later the operation was reported to have been a perfect success.—(Trans. Amer. Ophthal. Soc., 1871, p. 136.)

PARALYSIS OF THE FIFTH NERVE FOLLOWED BY SLOUGHING OF THE CORNEA.

Dr. W. F. Norris narrates a case of paralysis of the fifth nerve from the extension of epithelial carcinomatous disease, in which ulceration of the cornea steadily progressed in spite of the utmost care used to protect the cornea.—(Trans. Amer. Ophthal. Soc., 1871, p. 138.)

CONGENITAL FISSURE OF THE LIDS.

Dr. Seely reports a case of congenital fissure of the lids, which was peculiar in that there was a very large portion of skin attached to the globe. The eyeball was perfect.—(Trans. Amer. Ophthal. Soc., 1871, p. 142.)

CONGENITAL ABSENCE OF THE EYEBALLS.

Dr. Strawbridge narrates two cases in which he had seen children born without eyeballs, and mentions a third in which there was absence of one eyeball, and in the other a large coloboma of the iris and choroid.—(Trans. Amer. Ophthal. Soc., 1871, p. 144.)

OPTIC NEURITIS WITH BRAIN DISEASE (DROPSY OF THE OPTIC NERVE SHEATH).

Professor W. Manz writes on this subject. He alludes to Graefe's distinction between the engorged disc and optic neuritis (descending), and his explanation of the former as due to compression of the cavernous sinus. As an objection to this explanation, Professor Manz adduces the results of injections of vessels as carried out by Schwalbe. From these it is certain that engorgement of the vena centralis does not by any means necessarily follow on compression of the cavernous sinus. There are other normal channels for the return of the blood from the vena centralis. There does not even necessarily result a strangulation of the optic nerve entrance from stasis in the neighbouring veins. Such a stasis, wholly apart from its relation to inflammation is, however, often present, and is the first change noticed in

the disc; other symptoms, such as swelling, haziness, &c., following later, but, it may be, not for a very long time. What then is the cause of this stasis, if it be not the compression of the sinus? The answer is found in the results of experimental injections carried on during the preceding year by Schwalbe, Schmidt, and the author. These injections were made on animals either during life or after death in such a way that fluids were forced from the cranial cavity into the sheath of the optic nerve. These experiments show that it is very easy to distend the space between the outer and inner sheaths (sub-vaginal space, Schwalbe) from the arachnoid space, and that an accumulation of the fluid injected takes place around the insertion of the nerve where, however, a limit is reached, at least towards the inside of the eyeball. This result suggests another explanation of the strangulation of the optic nerve entrance. It is probable that the same changes occur during life which can be so easily and regularly produced experimentally.

In a case of tubercular meningitis which he published in 1865, the author found an enormous dropsical distension of the optic nerve sheaths, and felt sure that the exudation in these was intimately connected with the serous effusion in the cerebral ventricles and the arachnoid space. He thought that the fluid in the optic nerve sheaths was of local origin from the vessels in the neighbourhood (indigenous dropsy); and so also were explained cases published by others (Ammon, Stellwag, &c.). His attention was again called to this case after he had practised injections into the arachnoid space, and when he knew the results of Schwalbe's experiments.

He now examined the optic nerves in cases in which during life there had been a suspicion of intra-cranial mischief with or without ophthalmoscopic changes, by removing the roof of the orbit and laying the nerves bare from above. He found dropsy of the sheath so frequently, that he came to the conclusion that it must be an almost invariable occurrence in connection with intra-cranial disease. Before removing the nerve, for closer examination, he adopted the plan of tying it at the optic foramen. The amount of distension varied greatly, but was almost always more marked towards the insertion into the globe. In the first recorded case the membrane was spread out in the form of an ampulla, of which the subsidence towards the sclerotic was steep, but towards the optic foramen more gradual. The swelling was frequently slight, but the whole orbital portion of the nerve was thickened, the sheath distended, glistening, transparent, and giving exit to some drops of a clear or turbid fluid when opened. There was no particular congestion, but rather pallor. Microscopic examination of the fluid and of the sheaths varied in connection with the time which elapsed after death. They are given fully. The optic nerve and retina were variously affected.

In many cases no changes could be detected. He never obtained a specimen early enough to demonstrate slight œdema of the disc and its neighbourhood. In some there were changes characteristic of the so-called optic neuritis. The blood-vessels appeared normal. The dropsy of the optic sheath always existed on both sides, often however in different degrees. The conditions found within the skull, which he thinks have the closest relation with the above changes, are (shortly) the existence of fluid in the arachnoid cavity with evidences of increased intracranial pressure. These most frequently are met with together, but occasionally where no free exudation was found its previous existence was rendered probable by dilatation of the ventricles or flattening of the convolutions. The quantity of the fluid found did not seem to bear any direct relation to the dropsy of the optic sheath. The kind of disease within the skull seemed immaterial. In one case of hæmorrhagic pachymeningitis, the sheath and the subvaginal space contained partly fluid, partly clotted blood. The generally received opinion has been that the dropsy of the sheath originated on the spot by an extension of the meningitis to the optic nerve and its coverings. Far from denying the possibility of this, the author nevertheless believes that the results of injections have thoroughly justified the acceptance of a transference from the cranial cavity. Fluids which have been injected into the arachnoid or sub-arachnoid space with moderate or even feeble pressure, reach the eyeball through various channels which pass along the optic nerve. The outermost (supra-vaginal space, Schwalbe) is separated by the outer sheath of the optic nerve from the "sub-vaginal" space, and this again by the inner sheath from the "arachnoid sheath" (Axel Key). The supra-vaginal space on the one hand (ocular side) communicates with Tenon's space and the perichoroidal space (lying between the choroid and sclera), and on the other through the optic foramen with the arachnoid space of the cranium. The latter is true also of the "sub-vaginal space," whilst the spaces between the nerve and the inner sheath, according to Axel Key, are in connection with the sub-arachnoid space of the brain and spinal cord. Moreover, the latter author adds that both of the passages immediately investing the optic nerve often unite near the globe. We may thus expect that fluid, whether existing in the arachnoid cavity, as happens more often in injections, or in the so-called sub-arachnoid space, will pass, under a certain amount of pressure, within the cranium, into the space between the outer and inner nerve-sheaths, or even into or under the latter. In a case in which a false membrane resulting from a blood clot was found on the dura-mater, and still fluid blood in the cranial fossæ, there were also analogous changes in the optic nerves. A detailed account of these changes is given. Apart from the interest which this case has in connec-

tion with the share of the optic nerve-sheaths in intra-cranial disease, it also bears on the question of the entrance, or (if we regard the gradual increasing intra-cranial pressure as shown by the symptoms) the driving in, of blood into the optic sheath. This view is based chiefly on the slight changes perceived in the sheaths and the nerve itself as compared with the intense alterations which the meninges and the brain had suffered.

Attention has already been called to the support which the idea of transmission of fluid obtains, from the fact that the dropsy of the sheaths is always bilateral, though more marked on one side than the other. After the injections with Prussian blue, the coloured fluid was always found in both nerves, though only one arachnoid cavity was injected. So also with regard to neuritis descendens. This occurs on both sides, or is more marked on one side than the other, or one side may be affected before the other; and from this symptom the author diagnoses, and mostly with success, on which side the starting point of the disease has been. The fact that the neuritis, at least at its commencement, is on one side, will, if for other reasons one suspects a cerebral cause, allow one to determine with a fair amount of certainty, the circumscribed nature of the affection, and, by chance, its position. At a later period if the other eye becomes affected it is always a stage behind the one first attacked, which may therefore be recognised at any time.

The later changes which result from the dropsy of the sheath are those which have been described in various cases of neuritis, and are of all degrees, from a simple œdema to a well-marked plastic neuritis. They are described fully. The intra-cranial pressure always remains of a higher degree than that in the optic sheath, so that if the former diminishes, the latter may subside, and the ophthalmoscopic appearances vanish.

A case of dropsy of the optic sheaths in connection with miliary tuberculosis is detailed with the results of a microscopic examination of the nerves. He quotes and remarks on cases published by Leber and v. Graefe. In several cases of tubercular meningitis in which tubercles were found in the choroids, a retinal hyperœmia was diagnosed during life. He thinks this must have been choroidal and in connection with the tubercles, and was not in connection with the dropsy of the optic nerve-sheaths also present.—(Reprint from Deutsches Archiv. Klin. Med., ix, Bd.)

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Part I.

Original Contributions.

SUGGESTIONS FOR CLINICAL WORK IN OPHTHALMOLOGY.

By Jonathan Hutchinson.

It is sometimes of great use to point attention to what may be called gaps in our knowledge; to sum up what we have learned, and to shew where it is deficient. I cannot but think that just at present it is especially desirable to do this in respect to ophthalmic matters. We have advanced so rapidly during the last quarter of a century, have acquired so much, and have developed some branches into such wonderful detail, that the mind, contrasting our present possessions with those of the past, easily passes into a state of hope that at length we must have nearly approached completion. This impression is increased by observing the large amount of industry which has been devoted to many matters which in themselves appear to be but of transcendental interest, or of minor importance. If workers find themselves at liberty to elaborate with such painstaking devotion the most trivial departments of our science, surely, it is naturally assumed, our knowledge of all the more important subjects must have been

already placed in the most satisfactory condition. A man does not usually take to blackbird-shooting when there are partridges at hand. Now although there is no kind of stupid folly which I would more earnestly endeavour to avoid than the intentional depreciation of those who work at small subjects, or at matters which to superficial observation seem to lie at a distance from practical results, yet I must ask to be allowed to put in a plea in favour of the habit of "trying back" in the field occasionally, that we make sure that we have not walked past any larger game. It is quite true that in the field of science it is by no means easy to estimate the value of your quarry even when it is in hand, and on this account honour should be given to the worker with regard chiefly to the ability and industry displayed, and with but little reference either to the field selected or the products obtained. Many a discovery which looked pitifully small, or which the practical man regarded with scorn as a matter of dilettanti recreation rather than of real value, has proved subsequently to be the key to a hidden store of wealth. Still, however ready we may be with the laurel for those who have developed our knowledge of physiological optics, of the histology of the structures of the eye, and of its minute pathology, we may be permitted yet to assert that there is much in other departments still to be done. It is partly in consequence of a strong conviction on this point, and partly in answer to many private enquiries from young observers as to what remains for them to do, that I have ventured to write the following paper. I can only hope that I shall not be accused of presumption in doing so. I am well aware that it might have fallen into far abler hands, and am, indeed, not without hope that it may yet be supplemented by others. It would be difficult to suggest to the seniors in our specialty,—those whose lives have been spent in the acquisition of ophthalmic experience,—any more useful task than that they should put down for the benefit of others a statement of the questions which appear to them to need further

elucidation. We are too apt to wait until we think we have definite knowledge to communicate before we take up the pen, for, under many circumstances, our doubts and difficulties, fairly and candidly stated, are of more value, in their suggestiveness to others, than what we think to be our knowledge. It is upon those who have lived long and seen much that duty of this kind should mainly devolve; but not perhaps wholly upon them. I have often thought that it would be well for systematic authors, instead of covering ignorance by vague phrases, as is too often the case, to append to each chapter a list of what to their minds, fresh from the investigation of each subject, appear to be desiderata in respect to it. Clinical observation is a work of such immense width, that unless undertaken on system, and with a guiding thread, it is interminable, and may easily result in fatigue and disappointment rather than in profit. It is in the hope of contributing my small quota towards the object to which I have referred that I venture to publish the following fragments.

Glaucoma.

The chief facts respecting the more common forms of glaucoma have been well investigated. There are, however, some of its less frequent types which will repay further work. It is very desirable that all cases should be recorded in which a tendency to *relapse after the performance of a satisfactory iridectomy* occurs. I believe that it is a matter of general experience that if one relapse after iridectomy occurs, little or no benefit will be obtained from a second. These cases are so rare, that it is only by collecting examples from the practice of many ophthalmic surgeons, that satisfactory data for the investigation of their peculiarities can be hoped for. A certain number are already recorded in our ophthalmic journals.

All cases in which glaucoma occurs to *young persons* ought to be recorded, with careful attention to any circum-

stances in the history which might throw light upon the cause of the disease. Cases in which there is no abnormal condition of refraction should be kept in a group to themselves. The younger the patient the greater is the interest of the case. Is glaucoma, when it occurs under the age of 30, ever cured by the performance of iridectomy? Is there any other plan of treatment which influences its course?

In investigating the remote causes of glaucoma, attention should be paid to the *diathesis of the patient*, and especially enquiries made as to any family history of gout or other forms of arthritis. It is desirable also to record the temperament of the patient as denoted by colour of hair and iris. The influence of *neuralgia of the fifth nerve* requires investigation, for it is not at all an infrequent history that our glaucoma patients have, for long previously, been liable to severe toothache, and it is quite possible that in some cases this source of nerve disturbance stands as the true cause of the eye disease. Are cases in which facial neuralgia has preceded glaucoma more liable than others to relapse?

Cases of glaucoma in which indications of deranged function either of the fifth or of other nerves are present deserve attention. I have recently operated on more cases than one in which the patient noted an entire failure of the secreting function of the lachrymal gland. The patients, women, have become quite unable to express emotion by tears, although formerly accustomed to do so easily.

Retinitis Pigmentosa.

Ophthalmic surgeons have it in their power to add most important facts as regards the laws of *hereditary transmission* by the careful investigation of this most singular malady. There can be not the slightest doubt that it is remarkably hereditary, and in all cases the facts, as regards its transmission, should be recorded in the

utmost detail that they can be obtained. Cases which favour the belief that consanguineous marriages may produce a tendency to it are of especial value. In these care should be taken to avoid the fallacy that possibly a consanguineous marriage may only have intensified a previously existing tendency to the disease. All cases in which retinitis pigmentosa appears in a family for the first time, whether with or without the history of a consanguineous marriage, ought to be placed on record, after full enquiry as to all influences which could by possibility have acted as causes. In reference to this class of cases it must be recollected that, in a few instances, inherited syphilis may produce changes exceedingly like those of retinitis pigmentosa, but to be distinguished from the true disease on careful examination.

All cases in which retinitis pigmentosa is *non-symmetrical* possess much clinical interest. As a rule I should consider that any marked tendency to asymmetry was a suspicious fact in the direction of a remotely syphilitic cause. I do not know that I have ever seen a case of hereditary retinitis pigmentosa in which there was much deviation from symmetry.

In all cases of retinitis pigmentosa the presence or absence of symptoms of degeneration in other parts of the nervous system should be sought for: deafness, loss of smell, mental defects, &c.

An ophthalmic surgeon who may chance upon a good example of this rare malady, and may not feel inclined to trouble himself about it further than the limits of his own specialty, is bound in the interests of general medicine to hand it over for investigation to some naturalist of wider sympathies.

Diphtheritic Ophthalmia.

Whether we apply the term diphtheritic to all forms of conjunctivitis in which a pellicular or croupous coating of lymph is present, or limit it to those in which there is

solid deposit in the submucous cellular tissue, the malady is a very rare one in English practice. My impression is that a large proportion of the best characterised cases are met with in connexion with scarlet fever. It is not enough that the ophthalmic surgeon should satisfy himself as to the best means of treating this disease. Every case in which it is met with should be made the subject of special enquiry as to predisposing causes, as to contagion, state of health of patient, hygienic conditions of residence, &c., and more especially, as just hinted, as to the possibility of the presence of scarlatina poison. So few cases are met with in English practice that a brief record of every case would be no unworthy use of the pages of a journal. It is probable that conclusions would be arrived at of a character likely to be very useful in settling some of the debated questions as to the relationship between croup, diphtheria, &c. I am not aware that in England a diphtheritic type of ophthalmia has ever been observed to become epidemic; only a very few sporadic cases have come under my own notice. I believe that it is not usually attended by any throat symptoms, nor followed by that tendency to peculiar forms of paralysis which is so marked after pharyngeal diphtheria.

Paralysis of Accommodation.

It is well known that after pharyngeal diphtheria paralysis of accommodation very frequently results. It would be of great interest to determine how far this is due to the blood condition peculiar to diphtheria and how far to the special part primarily attacked. Can other inflammations of the throat, not diphtheritic, produce the same result? I have seen several cases in which accommodation-paralysis followed sore throats which were believed to have had nothing of the diphtheritic character in them. In one the patient had had pharyngeal abscess, and in two or three nothing more than a very slight and transitory

sore throat was admitted. Can inflammations of other parts of the mouth become the causes of this symptom? I have never seen any case in support of the belief that tooth-ache, gum-boil, &c., may produce temporary paralysis of accommodation, but I have been told that this belief is accepted by some German authorities.

Cases of Congenital Cataract.

Cases in which cataracts are really congenital, *i.e.*, the patient born with conspicuous opacity of the lens, are not nearly so frequent as has been supposed. Most of the cases which are put vaguely under the head "congenital cataract" are really cases of lamellar cataract in which the opacity developes during the first few years of life. If a new-born infant comes under observation with developed cataract the case should be scrutinized as regards the following points:—

A. Is the opacity lamellar or general?

B. Is there any central speck of the nature of a pyramidal cataract?

C. Does the child display any other defects or peculiarities of development?

D. Is it the offspring of a consanguineous marriage?

E. Is there any history of cataract having occurred in the family before?

F. In later years the course of dentition, both of the first and second sets, should be noted, as also the rate of the child's growth.

G. After removal of the cataract, the fundus of the eye should be examined and its state recorded.

H. In case the operation should, for any reason be deferred, it would be interesting to observe whether any spontaneous tendency to clearing of the opaque lens occurred. I make this last remark because, in the case of a congenital cataract in a rabbit under my own observation, the lens, which at birth was wholly white, became in

the course of a few months transparent everywhere, excepting a little opacity at the posterior pole.

Unsymmetrical Cataract.

An interesting paper might be written upon the various conditions under which cataract of one eye only is met with, attention being specially given in each instance to the probable cause. Some of these occur in infancy, but more frequently monocular cataract is met with in middle life. Some cases are probably only examples of delayed symmetry; but even in these, if the interval be one of many years, it would be of interest to ascertain, if possible, whether there was anything to explain the precedence taken by one eye. A few other cases of monocular cataract are to be explained by reference to injuries which have been overlooked or forgotten. Excluding all such from the group, it would be of much interest to observe whether the irides usually differ in tint in cases where only one eye becomes the seat of cataract; whether there is marked difference in refraction; and lastly, whether the patient shows any other deviations from symmetry in his head or body.

Influence of Race and Climate upon Eye Disease.

It is, I think, much to be desired that one or more of the highly-educated and intelligent students who, according to present custom, devote long periods to the study of eye diseases in the several European capitals should attempt something in the way of an estimate of the relative frequency of certain of the maladies which come under their observation. The comparison of the published reports of hospitals might, it is true, give us some data for international contrasts of this kind, but not without great fallacy, on account of want of uniformity in the use of nosological terms. What I should like would be that some observer who had had opportunities of see-

ing large numbers of patients in Berlin, Vienna, Paris, and London should collate such statistics as he could find published, and correct them by the impressions which he had himself formed. Conclusions of considerable interest and value would in all probability be arrived at. The great preponderance of granular inflammations of the conjunctiva and their results, in Ireland and in France would, I think, be clearly brought out. Wider investigation still in the United States and in other parts of Europe would, I believe, make it clear that this is not a matter of habits of life or peculiarity of diet, but that it is due to race. My own observation and the result of enquiry would lead me to believe that in English and Scotch practice a smaller proportion of these cases is to be met with than in any part of the Continent, and that Dublin and Paris might, in reference to its abundance, compete for precedence.

I believe that it would be found that the various forms of arthritic iritis are far less common in the cities of Germany and Austria than in London.

(To be Continued.)

ON A NEW OPERATION FOR DISTICHIASIS, WITH A SUCCESSFUL CASE.

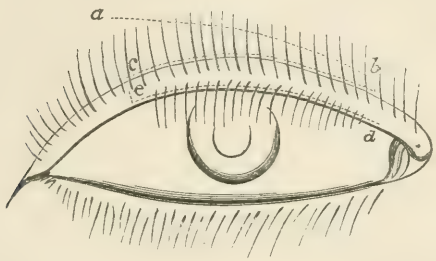
By W. Spencer Watson, F.R.C.S.

A young woman, æt. 22 years, came to the Central London Ophthalmic Hospital, with severe keratitis in the right eye of some years' standing, which on examination was found to be due to the irritation produced by a second row of eyelashes in the upper lid in its middle third. The faulty eyelashes were directed almost directly downwards, and swept the upper half, or two-thirds of the cornea at each movement of the lid. The cornea itself was very rough and nebulous in the greater part of its extent, and the patient had constant photophobia and pain from the presence of the faulty eyelashes.

On October 12, 1871, I performed the following operation, the patient being under the influence of chloroform. A horn spatula being passed under the eyelid, was held by an assistant in such a position as to keep it steady and stretched out horizontally and away from the globe. A horizontal incision was then made in a plane parallel with that of the tarsal cartilage along the middle third of the lid, immediately behind the line of implantation of the eyelashes, the point of the knife being thrust upwards and slightly backwards, to the extent of about 2‴ or 3‴ from the free border (the same incision being made as if for the purpose of scalping the eyelid, as in the old operation for trichiasis), and carried along till it reached the point *e* in the diagram. A second incision was then made in a plane at right angles to the first, along the skin surface of the lid from *e* to *b*, and the included flap between these incisions dissected off from the subjacent tissues, and the two incisions joined by a vertical incision at *c*. By their means a triangular flap was formed, attached by a broad base at *b d*, and free at *e*, and including both

rows of eyelashes with their bulbs and a strip of cartilage. A second flap was then formed by a third incision from *b*

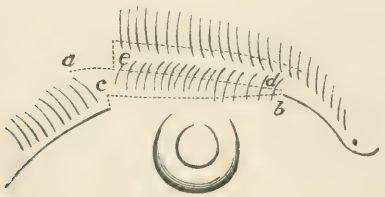
Fig, 1.



to *a* in the integument of the lid, and this flap freed by dissection from the subjacent muscle.

The flap, *a b c*, was then turned down into the position of the first flap, and the first flap in turn placed into the position recently occupied by the second. Both flaps were secured in their new positions by interrupted sutures, as shown in the smaller diagram. It is then seen that a

Fig, 2.



portion of the tarsal margin at the outer canthus has been left untouched, and between this and the transplanted row of eyelashes there is a bridge of skin of about 3‴ in width. It was at first thought that it would be necessary to divide the bridge of skin, in consequence of the interruption in the line of eyelashes which it would cause if left. As, however, the wounds healed in a few days, it was found

that the eyelashes of the transplanted flap fell so completely over the interruption, that the latter was hardly noticed. In a fortnight from the date of the operation the edge of the eyelid had assumed a normal appearance, and all irritation of the eye had ceased.

Remarks.—It is obvious that this operation is equally applicable to many cases of trichiasis, and to cases of distichiasis, in which there is a double row extending from one end of the eyelid to the other, the only modification required in each case being in the length of the flaps. It appears to have a great advantage over the ordinary method of scalping, and is more easy of performance than either v. Graefe's or Arlt's, and is effected without removing any portion of skin.

In the particular case reported, the appearance of the patient was strikingly improved, as the eyelashes in their new position were very long, and came horizontally forward, in a way to cast a very complete shadow over the cornea, at the same time hiding any appearance of cicatrix either above them or below, excepting on a very close scrutiny.

DISTICHIASIS.—PLASTIC OPERATION.

Explanation of the Woodcuts.

The dotted lines indicate the course of the incisions, and the letters in Fig. 1 indicate the same points as the same letters in Fig. 2.

Fig. 1. The lines at *d e* and *c b* form a flap, including the roots of the faulty eyelashes. The lines *c b* and *b a* form a triangular flap of integument in the upper eyelid.

In Fig. 2 these flaps are transposed, the lower flap being in the position lately occupied by the upper one.

A CASE OF SYMPATHETIC OPHTHALMIA IN WHICH RECOVERY RESULTED.

By Henry Power, F.R.C.S.

The satisfactory termination of severe sympathetic ophthalmia is so rare an event that I have thought it advisable to place on record the details of a case of this nature that recently fell under my notice, and which caused me much anxiety for many weeks.

E. H., æt. 19, a rather small, pallid, and delicately-made young man, engaged for six or seven hours a day in an office, was playing with his brother, on the 28th February, 1872, when he received a stab at the inner margin of the cornea of the left eye with a steel pen. A little pain and lachrymation followed, and a small black swelling, as large as the head of a pin, appeared at the point of injury. Little notice was taken of this spot for a fortnight, and it appears to have been regarded as an ink-stain. The eye continuing to be red, the mother at length examined it more carefully, and observing the swelling, brought him to me on the 15th March. He then complained of pain, but not different from that which would be produced by the presence of such a foreign body under the lids. The inner part of the conjunctiva was injected, with one or two large vessels running up to the protruded portion of iris, and there was considerable lachrymation. The pen had penetrated exactly in the horizontal meridian of the eye at the junction of the sclerotic and cornea. The pupil was displaced towards the wound, and the protrusion consisted of the periphery of the iris, the margin still remaining free and moveable under the action of light. The right eye was perfectly healthy, with a bright blue iris, acting freely under the stimulus of light, large pupil, and clear bluish sclerotic.

Not anticipating how serious a case it would prove, I touched the protrusion lightly with a point of nitrate of silver, instilled a drop of atropine solution containing two grains to the ounce, applied a pad and bandage, and directed him to go home and keep himself at rest for a day or two.

On the 19th March he returned to me with the parts in precisely the same condition as on the previous visit, the white precipitate or eschar formed by the nitrate having washed away, and the little tumour being as prominent and as black as before. The same measures were repeated, the point of the nitrate being applied a little longer and rather more firmly.

On the 1st April there was still no change, except that the *right* eye was a little congested and watery, and both the lad and his father becoming impatient about his absence from work for an ailment apparently so trifling, I snipped off the protrusion without any difficulty, with a pair of scissors curved on the flat. Noticing the slight weakness of the right eye, I warned the father that injuries of this kind were occasionally followed by serious results, and ordered for the boy a grain of quinine and three grains of hydrargyrum c. creta, as an alterative and tonic, three times a day.

On the 4th April, sympathetic ophthalmia had become established in the right eye. Both eyes were of a rose-pink tint, the subconjunctival and scleral vessels being specially congested. The pupil of the right eye was contracted. and there was considerable intolerance of light and lachrymation. There was pain, but only moderate, in the eyes, brows, and temple; and I could not find that the sclerotic in the left eye near the injury was particularly sensitive. A leech was ordered to each temple, and he was directed to take the following draught three times a day:—

Sol. strychniæ, ♏iv.
Tinct. ferri. sesquichlor., ♏x.
Quiniæ disulph., gr. ii.
Sp. chloroform, ♏x.
Aquæ, ℥i. Ft. hst.

On the 8th April, general appearance of eyes unchanged. On close examination, several tags of adhesion were observed between the iris and the capsule of the lens in the right eye. A strong solution of atropine was instilled into each eye.

9th April.—The adhesions have broken down.

10th April.—Has come up to town to be within reach. No pain, both pupils moderately dilated. The angry look of both eyes still persistent, T + 1 of left, T n. of right. He was now

kept in a very dark room, the blinds being drawn down and the shutters closed. To continue the strychnia and iron.

11th April.—Experienced pain on waking, which he attributes to the room being light. Pupil of right eye well dilated, congestion less. No pain at time of visit. No increase of tension in either eye. Left eye examined very carefully with blunt end of pencil, but no specially tender spot could be discovered. Pressure was not complained of till it was considerable in amount. No atropine was instilled.

12th April.—Passed a bad night. Pupils contracted, especially of right eye; complains of pain. There is not much intolerance of light, perhaps not more than any one would experience who had been long sitting in the dark. The examination was usually made by slightly opening the shutter and the light admitted was moderate. It always caused a little lachrymation.

13th April.—A consultation was held to-day with Mr. Critchett, who commented upon the slight disposition to the effusion of lymph that appeared to exist either in the substance or on the surface of the sympathetically affected (right) eye. No change was made in the treatment, except that a leech or two should be occasionally applied. Pupils widely dilated with atropine.

14th April.—Two leeches applied last night; bled freely; thinks he is a little better; pain inconsiderable. Congestion of a pink-rose colour, very marked in both eyes.

15th April.—The vision of the eyes was tested to-day, and it was found that he could read 16 Jäger with either eye, but with neither could he make out a word of 14. Pulse to-day, as it has been throughout the affection, high, ranging from 96 to 106. His temperature had unfortunately not been taken, but there was no reason for considering it to have been high; hands and feet usually warm. No feverishness or thirst complained of. Appetite good. Bowels always regular and motions natural.

16th April.—Two more leeches applied.

17th April.—Had a good night. Pupils well dilated. Left eye decidedly paler. Sees everything much brighter with it than with the right. The strychnia was discontinued for a day or two, and instead I gave him tentatively a quarter of a grain of belladonna in a pill every six hours.

19th April.—Woke in the middle of the night perfectly free from pain; but on waking at six, experienced sharp pain in the

right eye, though the room was quite dark. Pupil of left eye widely dilated; of right, contracted, with a point of adhesion at inner margin of iris, both eyes watery, redness of conjunctiva, and sclerotic of right eye increased, but not of left. It would hence appear that the slightest touch of the iris or ciliary processes with the lens is apt to set up irritation. When he looks down and then suddenly up, he experiences pain and a flash of light in the right eye. No other movement of the eye causes this flash.

20th April.—Belladonna and glycerine rubbed round the eyes. Left sclerotic paler. Can read No. 14 Jäger with left eye, indicating marked improvement. Continue belladonna pills, and add quinine gr. i, and hyd. c. cret. gr. iii to each.

22nd April.—Two leeches applied.

25th April.—Improvement slight but perceptible. General health and spirits good. Injected into the right arm two minims of a solution of acetate of strychnia, containing gr. iii to one ounce of distilled water, or about 1–80th of a grain. The pills were directed to be continued. Returned to the strychnia and iron mixture, which he took almost uninterruptedly from this time forward. No effects from the injection.

26th April.—Five minims of the strychnia solution injected. Is free from pain, and says the vision of right eye is improving, that of left rather duller. I endeavoured to examine the fundus with Carter's small ophthalmoscope and a candle, but could not see the fundus in either eye plainly, partly on account of the indifferent light, partly on account of the intolerance of light and lachrymation, and partly, I thought, because the media were turbid. I sent him out for an hour this morning, with a pair of dark glasses with flaps, and a shade, as he was beginning to be weary of confinement. In the evening he was better for the exercise, and I again endeavoured to examine the eyes with the ophthalmoscope, and with better success. The whole surface of the left lens was found to present punctated opacities, which were especially marked at the lower part. The disc was not clearly visible, but gave me the impression of its margins being obscured by serous effusion, and this was quite borne out by examination of the right eye. The media of this eye were much clearer, but the outline of the disc was entirely lost. The vessels (veins) were large and numerous. The examination was necessarily a

hasty one. Tension of both eyes normal. Sparks occasionally seen. No pain.

27th April.—Injected 7 minims of strychnia solution, morning and evening, and ordered two blisters. In the evening, eyes paler than they had hitherto been. The vision with the left eye was the worst, but he could distinguish the forms of people on the opposite side of the street.

28th April.—Blisters rose well. Has had no pain, no sparks. The capsule of the left eye more opaque, with an infinite number of whitish-grey round spots, not visible by direct or oblique light, but very perceptible under the ophthalmoscope. No outline to the left disc, that of the right rather more defined than before, but still very much blurred. No small arteries visible. Large veins partially obscured for some distance from their points of entrance. Can read No. 10 Jäger with right, and No. 14 with left.

29th April.—Eight minims of the strychnia solution injected in the morning, but some headache following, it was not repeated at night. Colour of the sclerotic of both eyes steadily becoming paler.

2nd May.—The same treatment has been continued, but to-day the breath being slightly tainted with the mercury, its use was discontinued. The iron, strychnia, and quinine were continued.

4th May.—Two leeches last night. Can read No. 8 Jäger with right, and No. 6 with left; both discs much better defined. External appearance of eyes much improved. Redness, lachrymation, and intolerance of light all much diminished.

9th May.—Redness almost gone. With right can read No. 4, with left, No. 6. The margins of both discs still very indistinct, a greyish haze extending for a considerable distance over the retina.

14th May.—Can read No. 1 Jäger with right, and No. 4 with left. The left retinal vessels are almost lost, as they pass across the disc. In the right eye the disc more defined, all the vessels large, tortuous, and exhibiting a distinct curve where they cross the margin of the swollen papilla. Subcutaneous injection of strychnia stopped.

On the 18th of May, when all had been going on well, he had

a relapse, especially affecting the right eye. It was found that he could not read 14 with this eye, but could make out 6 with the left. Right eye much more red, tender, and painful; nevertheless, the disc was certainly not more obscure than before. On the following day, the left was in the same condition as the right. The relapse was clearly due to neglect of the use of atropine, and was immediately relieved by its being recommenced, and by a repetition of the injection of eight minims of strychnia.

21st May.—With the right eye can read No. 14 J. a few minute dots visible with the ophthalmoscope upon the capsule of the lens; media otherwise clear. With left eye No. 6 J. read with difficulty. To apply one leech to each temple.

23rd May.—Has again omitted to instil the atropine, and as a consequence, there is more inflammation of the left eye. It was observed to-day that although much smaller print could be read with the left eye than with the right, yet that the vision of the right eye for distant objects was very superior, a circumstance of which I can offer no explanation. No. 18 Jäger could be read at 8 feet with the right eye, but 20 could not even be dimly seen with the left at that distance.

27th May.—Can read No. 10 J. with right, but only No. 8 with left. No pain since the 24th.

30th May.—All inflammation has steadily subsided since the dilatation of the pupil was effected. With right No. 8 Jäger, with left No. 8″ also. Left disc very blurred. Opacities on capsule appear smaller and fewer in number. Right disc better defined, tension natural in both. No strychnia injected.

3rd June.—Right, No. 6 of Jäger, left, 6 Jäger; right 20 Snellen, read at 10′; left, 20 Snellen, read at 3′.

11th June.—Progressing favourably. No. 1 of Jäger read with right, and No. 2 with left. Definition of discs, especially of right, greatly improved. Recommended to go into the country.

5th July.—Since the last visit, has been at Margate, and returns looking remarkably well. The right eye quite natural in appearance, the left a trifle congested. No pain in either eye. Can read No 1 at 6 inches with both the right and the left eye. With the right can read No. 20 of Snellen at 20 feet; with left he can only read this type at 18 inches. On ophthalmoscopic examination, the media of the right eye are found to be perfectly

clear, and there was nothing that I should have noted as peculiar about the disc, except that it was pale. In the left eye there was a triangular group of small spots on the upper part of the capsule of the lens, but the media were otherwise clear. The disc tolerably well defined, but still blurred, especially at apparent lower part, where the vessels were partially obscured.

On the 18th, I saw him for the last time. He could then read No. 1 with both eyes. The eyes looked perfectly healthy, except for the displacement of the left pupil. He drops in atropine once a week.

I attribute the successful issue of this case to the pupil being kept widely dilated from an early period, and to the free use of powerful tonics during the more active period of the disease. Whenever the atropine was intentionally or accidentally omitted, even for a day, so that the iris played over the capsule of the lens, an exacerbation of all the symptoms was sure to occur, a tag of adhesion was formed, pain was experienced, and the redness and watering of the eyes augmented. This was noticed over and over again. If the lymph of which such tags of adhesion be really composed of white corpuscles, we might imagine the course of events to be that owing to paralysis (reflex) of the vasomotor nerves of the vessels of the iris of the sympathetically affected eye, these are congested and dilated, and in fact in the same state as those of the conjunctiva and sclera. So long as the pupil is widely dilated, they are rendered tortuous, and a certain amount of pressure is exerted upon them, but when the pupil contracts, these vessels become straight, and their delicate walls rub against the capsule of the lens, the friction causing or facilitating the escape of the white corpuscles, which constitute the adhesion, and thus the play of the iris is interfered with at one point. The nerves are here consequently dragged upon, pain with the reflex manifestations of intolerance of light, increased lachrymation and redness of all the vessels supplying the eye are induced, which again leads to fresh exudation, and thus the disease has a tendency to perpetuate itself.

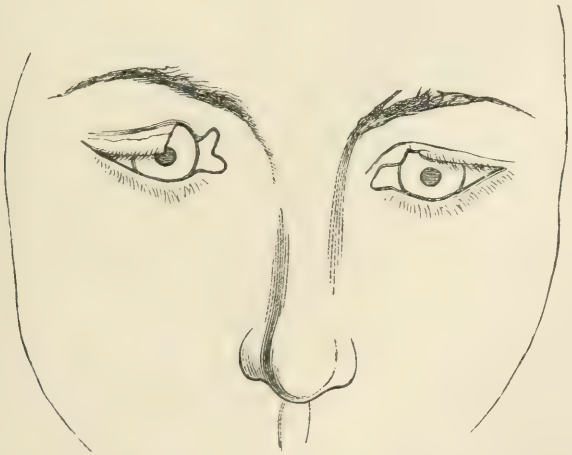
The beneficial action of tonics, such as iron, strychnia, and quinine, is readily explicable on this view: the first constringing the walls of the smaller arteries, and thus diminishing the supply of blood to the part; the second strengthening and giving tone to the nervous system, while the third, as Birz and others have shown, materially influences the activity of movement and the escape of the white corpuscles of the blood. I must acknowledge that my patient was a favourable lad to treat, being of very quiet and unexcitable disposition, extremely steady in his habits, and most obedient in following out the directions given to him.

CASES OF CONGENITAL PECULIARITIES IN THE EYELIDS, &c.

By J. F. Streatfeild.

I.—*Case of Congenital Fissure (Coloboma Palpebræ) of both Upper Eyelids.*

The illustration showing the appearance of this very uncommon case is taken from a sketch I made many years ago of one of the out-patients of Moorfields Hospital. It was made before I had any official connection with the hospital, when I was a student there, that is to say, when I was beginning to learn ophthalmology, but it will be seen,



from the very ostensible nature of the case, together with the negative points of the history then obtained, that it required no very special training in order to its right diagnosis. Besides this, it was the opinion of the surgeon in whose practice it occurred, and of all who were present at the time, that the case was, unmistakeably, of the nature of coloboma. I made a drawing of the patient, and (I had more time then at my disposal than I now have) not only of the eyes and eyelids, but of her

whole face and head, and (it was very like her) thus I have a better recollection of the case, and I seem to see the patient as if she now stood before me, though my sketch has been forgotten for so long a time since it was made in an old portfolio, and I have no written memoranda in my old note-books that I can lay my hands upon. The patient was a woman of about thirty years of age. She came to the hospital for some unimportant affection of vision not concerning the external parts of the eyes or the eyelids. She had not then, nor was there any history of, any kind of ophthalmia—no past or present inflammation of the eyes—no redness or irritation or discharge of the eyelids, conjunctiva, or cornea, &c., such as might perhaps be expected from the exposed state of the eyeballs. Great clefts, symmetrically placed on the right and left side, existed in the upper eyelids towards the inner side of the lid in each of them; the right fissure was double, as some "hare-lips" are double. The clefts extended quite through all the structures of the lid, so that the ocular conjunctiva was bared to the extent of the fissures in the upper lids. There was no history of any injury or any appearance of cicatrization about the margins of the clefts or extending upwards above them, as if they had been lacerations imperfectly healed, the raw edges not having been properly brought together. The margins of the clefts were quite supple and not at all thickened. There was no appearance as if the eyeballs had suffered from exposure, and she complained of nothing of the kind. It seemed that the orbicularis palpebrarum—as it surrounds the lids, but is anatomically attached internally to bone—had power in this case whenever it was in action, and the lids were closed, to approximate to a great extent, if not to close, the open clefts. And then again it must be noted that these fissures were not in front of the corneæ, which were as completely protected, under ordinary circumstances, by the eyelids, as in the normal condition. I have no recollection of the state of the upper puncta, but

their condition seems to be always very unimportant so long as the lower puncta are in their normal state. Eyelashes only grew from those parts of the free margins of the upper lids which would have formed a part of its proper outline in the normal condition. The patient, in the sketch, is looking a little downwards, so as to show the whole extent of the three clefts more perfectly. She had no hare-lip, cleft palate, nor, I believe, any other congenital malformation. She cared nothing for the appearances of the clefts, which indeed were not very conspicuous deformities, and no cosmetic operation was done or even proposed to her. As to other cases of coloboma palpebræ, I have never myself seen but one, and this but recently, in the practice of one of my colleagues at Moorfields. Wilde ("On the Malformations and Congenital Diseases of the Organs of Sight," 1862, p. 20) says, "it has only been observed in one eye at a time." It does not appear that any case had occurred in his practice. Nor in that of Wecker ("Maladies des Yeux," 1867, vol. I, p. 742), who refers to seven authentic cases previously published by various authors, in one of which a coloboma existed in the lower, as well as in the upper lid.

II.—*Abnormal Pendulous Folds of the Conjunctiva.*

M. Wecker, in this chapter on the "Congenital Anomalies" of the lids, refers, by the way, to two recorded cases of "supplementary lid," and this inclines me to record the fact, that I have lately had a case which resembled those so called by him, and I have certainly seen other similar cases. I have always called them abnormal pendulous folds of the conjunctiva, which, in all the cases I have seen, have been at the *upper and outer* part of the eye, and more or less visible below the margin of the upper lid. In the last case the patient was a boy of 10 or 12 years of age, who came with his mother to Moorfields in some alarm, saying that something was growing over his eye. She told him to look downwards, and showed me

the conjunctival fold projecting a little beneath the upper lid of the right eye and at the upper and outer part of the eyeball. I suppose they had just discovered it. It appeared externally just like the rest of the conjunctiva, which was healthy, but the fold was evidently much thicker than a mere doubling of conjunctiva alone would have made it. It never reached quite to the margin of the cornea; his vision was no way affected; and it did not interfere in any way in the movements of the eye. It could hardly be said to be a deformity, but in most of the positions of the eyeball it could be seen, and I therefore offered to remove it, and as the boy and his mother both wished it done, I did the little operation at once. The patient being under the influence of bichloride of methylene, I seized the abnormal fold at the middle with toothed forceps, and using scissors curved on the flat, the two blades passed one external and the other internal to it; it was easily removed in two cuts, first one from above and then another from below it, joining the first behind the point at which it was held by the forceps. In this way the trifling deformity and cause of their anxiety has been quite removed.

A REPORT ON THE FORMS OF EYE-DISEASE WHICH OCCUR IN CONNEXION WITH RHEUMATISM AND GOUT.

By Jonathan Hutchinson.

(Continued from page 332.)

Case XVIII.—*Double Iritis—Rheumatic Pains—Family and Hereditary History of Rheumatic Fever.*

Mr. P., æt. 30, of dark complexion, was sent to me from Montreal, on account of old iritis and opacities in the vitreous; the iritis had begun with muscæ in November, 1869. There was no history of either syphilis or gonorrhœa.

This patient was somewhat liable to rheumatic pains. He stated that whenever he got his knees wet he invariably had a bad cold, but not any special rheumatic attack. One of his brothers had died of rheumatism affecting the heart; his mother and several of her relatives had suffered for some time from chronic rheumatism, and an uncle had had rheumatic gout. On examination I found that he had posterior synechiæ in each eye, and floating bodies in the vitreous of the left. Vision was perfect in the right eye; with the left he could see $\frac{20}{30}$ and 3 J. with difficulty.

Mr. P. remained under my observation on and off for three years. He had several slight relapses of iritis always from exposure to cold. I feel certain that he is not the subject of syphilis and that his iritis is of the arthritic type. It is important to note that the vitreous suffered, and that in fact muscæ were the first symptom.

Case XIX.—*Repeated Attacks of Iritis in each Eye—Rheumatic Pains in small Joints—Facial Neuralgia—Hereditary History of Rheumatism.*

Miss Norville, æt. 47, consulted me on November 11, 1869, for iritis of the right eye. On examination I found general dimness of the cornea, a small and indistinct pupil (but no nodules

of lymph on the iris), and some ciliary congestion, with enlargement of the emerging vessels; vision was so much impaired that she could not see letters of 100 at 12 inches. The tension of the eyeball was doubtfully increased.

She stated that the dimness had been coming on gradually for about five weeks, but that the congestion and pain had appeared only about a week before; the pain was sometimes very severe. She used atropine freely and for many days under my direction, but the pupil would not dilate in the least. Her vision afterwards gradually improved, until she could see $\frac{20}{50}$.

The above was her third attack of inflammation in the eyes; the two previous attacks were in the left eye; the first occurred six years before I saw her, and she then had iridectomy performed by Mr. Streatfeild (whether for glaucoma or for adhesions did not seem quite clear). In May, 1869, she had her second attack, a relapse in the left eye. She consulted Mr. Critchett towards the end of the attack, which lasted six weeks.

Since she first consulted me I have seen her again (February 11, 1870), for a relapse of inflammation in the eye; it began twelve days before. The lids were much inflamed and excoriated; the cornea was steamy, but there was no marked increase of tension; this attack was not attended by much pain.

This patient has had rheumatic pain in some joints, especially those of the fingers, but this symptom had never been very severe; she had also been liable to neuralgia in the face and forehead. She had never had sciatica or lumbago. She had not been very liable to sick headaches. Her father was "a martyr to rheumatism."

In her eyelids, surrounding the eyes, but not specially in the xanthelasmic positions, there were a number of small flat patches.

Case XX.—*Repeated Attacks of Iritis in each Eye—No History of Rheumatism.*

Mrs. Mann, æt. 64, consulted me on March 10, 1868, on account of recurrent iritis in her right eye; it was rather a severe attack, the pupil being nearly excluded, and dilating imperfectly with atropine, and vision being very much impaired. The inflammation yielded quickly to blisters, atropine, and iodine. She had had a similar severe attack in the same eye three years before,

and the left eye was slightly inflamed at the same time; between that time and the date of her second severe attack she had suffered two or three slight attacks of inflammation in the eyes. She never considered herself rheumatic.

Case XXI.—*Double Iritis—Repeated Attacks—No Rheumatism.*

Mrs. Jolly, æt. 55, a healthy widow, came under my care, first in May and June, 1866, for double iritis, affecting the left most severely. I treated her with mercury (to salivation), blisters, and atropine. She thought the atropine irritated the eyes. I also did an iridectomy in the right eye. After a considerable time the inflammation subsided, but it left a closed pupil on the left side; with the right eye she could see to read the newspaper. She remained in good health and free from inflammation of the eyes until May, 1867 (exactly a year from the date of her first attack), when she suffered a severe relapse of iritis in the right eye.

She assured me that she had never had rheumatism, with the exception of occasional pain in the right knee.

Case XXII.—*Repeated Attacks of Double Iritis—One Eye Lost from Iritis—Liability to Lumbago of a Severe Character.*

John Fish, æt. 64, a healthy country labourer, was admitted on May 21, 1868, under Mr. Hutchinson's care, at the Royal London Ophthalmic Hospital, for iritis in the left eye. The left pupil was partly occupied by lymph; the iris was adherent at the lower part, and there were numerous fine lines of false membrane crossing the pupil; the pupil dilated fairly with atropine. The patient stated that he had had repeated attacks of iritis during the previous six years. His right eye had suffered more than his left, and was quite blind, with a flattened and opaque cornea. He had been very liable to lumbago, and had on several occasions been in bed for a fortnight with it; he had had an attack only a fortnight before his admission.

Case XXIII.—*Iritis in One Eye—History of Rheumatism in several Joints.*

Alexander Corbett, æt. 39, a pale, broad-cheeked man, was admitted under Mr. Hutchinson's care, at the Royal London

Ophthalmic Hospital, on November 8, 1869. He was suffering from his first attack of iritis. The right eye was affected, and the attack had begun a week before his admission; the conjunctiva was congested, and of a brick-red colour, a fine white ring being left just where the conjunctiva joined the cornea; the pupil dilated very irregularly under atropine; the fundus could be seen dimly, but no disease was made out. The left eye was unaffected. During the two preceding months he had twice had attacks of rheumatism, consisting of pain in the neck, shoulders, right elbow, and right wrist, and in the calf of the left leg; the joints had not swelled. He had never had rheumatic fever. He had had gonorrhœa twice, and chancres 15 years ago, but neither rheumatism nor secondary syphilitic symptoms of any kind followed. Twelve years before admission he had inflammation of the eyes, but from his description it was probably only catarrhal ophthalmia.

Case XXIV.—*Recurring Iritis in a Patient subject to severe Rheumatic Gout.*

Richard Clark, æt. 48, was admitted under the care of Mr. Hutchinson, on June 6, 1870, at the Royal London Ophthalmic Hospital, for iritis of the left eye. The eye had been inflamed ten days, when he applied; the conjunctiva was much congested and swollen, the cornea hazy and vascular at its margin, with a narrow white line of slightly swollen conjunctiva surrounding it; the pupil dilated very imperfectly under atropine, and seemed to be tied down almost all round. There had been considerable pain in the eye at first, but this had subsided. In three weeks he was well, only a single iritic adhesion remaining; the treatment consisted in blistering, atropine, and the administration of colchicum and iodide of potassium.

This was his second attack; he had been under Mr. Critchett's care for "rheumatic ophthalmia" five years before. He had had three attacks of what he called rheumatic gout, the first of which occurred when he was only eight years old. He had been laid up for five months with a severe attack of the same disease before his first attack of "rheumatic ophthalmia." In these attacks of arthritis the large joints only had been affected.

CASE XXV.—*Recurrent Iritis in a Woman; both Eyes Lost—History of Rheumatic Fever.*

Mrs. Sweetman, æt. 49, living formerly at Greenwich, afterwards at Grimsby, in Lincolnshire, was in the first instance under Mr. Dixon's care, at the Royal London Ophthalmic Hospital, for double iritis; this was in January, 1867. In June of the same year Mr. Dixon did iridectomy (for artificial pupil) in each eye, and the right eye was somewhat improved. She continued to attend, and towards the end of 1868 came under the care of Mr. Hutchinson, by whom a second iridectomy was made in the right eye in January, 1869. The operation was followed by iritis, and the pupil closed. In April, the other eye (the left) became inflamed and painful, and she was advised to submit to excision; she deferred the operation till September. The remaining eye (the right) was at that time quite blind from occlusion of the pupil. In June, 1870, she again applied on account of pain in the right eye; the eyeball was considerably congested, and very tender on pressure.

In 1865, about two years before her first attack of iritis, she had a severe attack of rheumatic fever. She was ill for many months, and her joints were swollen and painful; her medical attendant considered that her heart was affected. She did not know of any family history of rheumatism or gout. Her attack of rheumatic fever was preceded for several months by indefinite pains and shivering, and by yellowness of skin. She asserted that her doctor told her it was "dumb ague." She was living in an aguish part of Greenwich at the time. She took quinine without benefit to these symptoms. There was no history of syphilis.

CASE XXVI.—*Recurring Iritis in One Eye, in a Woman suffering from Tertiary Syphilis.*

Elizabeth Wisker, aged 35, married, and the mother of four children, was admitted under Mr. Hutchinson's care, at the Royal London Ophthalmic Hospital, on July 7, 1870, suffering from iritis in the right eye. There was much congestion of the sclerotic, especially in the ciliary region, the aqueous was slightly muddy, and the pupil dilated irregularly under atropine; the eyeball was very tender when pressed. The attack had begun six days before,

and she had had great pain in the eye. She stated that she had had a similar attack a month before, but that it was slight, and passed off in three or four days. For eight years she had been liable to pains, which she described as "rheumatic," in the right arm and in both knees. There could be no doubt that she was also the subject of tertiary syphilis, for there was a large osseous node on her right humerus at the time of admission, and the scar of a "lump," which had broken and healed over the right patella. Ten years before admission she had a still-born child, and it seemed possible that her syphilis dated from that time. Her iritis improved rapidly, and the synechia disappeared under blisters, atropine, and the internal use of iodide of potassium and colchicum.

Case XXVII.—*Iritis—Cataracts—Preliminary Iridectomy, followed by severe Iritis—Rheumatic Pains—History of Rheumatic Fever in a Daughter—Possible Syphilitic Complication.*

Mrs. Gorsuch, æt. 62, was first under Mr. Hutchinson's care, at the Royal London Ophthalmic Hospital, in 1868, when she was told that she had commencing cataracts; her sight had then been failing for more than thirty years, and she dated the beginning of her failure from a confinement. Two years later, September, 1870, she again came under my care. It was found on examination that she had evidence of past iritis in the existence of adhesions between the iris and lens capsule. The cataracts being complete, on September 15, 1870, she underwent double iridectomy preliminary to extraction. The operation was followed by severe iritis in each eye, obliging her to remain in hospital for three weeks.

She believed herself to be free from any tendency to rheumatism, but stated that of late she had had slight pain in her knees. Her eldest daughter had had an attack of rheumatic fever. No decisive history of syphilis could be obtained, but her former medical attendant considered that she had suffered from it twenty years before, when he attended her. She had had six miscarriages and fourteen living children; six of the latter had died, several of them under two years of age, but none under six months. The only suspicious symptoms in the children had been thrush, and this had occurred only in one or two of them.

CASE XXVIII.—*Double Iritis—Rheumatism—Hereditary History of Chronic Rheumatic Arthritis for two generations.*

John Watkins, æt. 42, a healthy-looking man, of stout build, with florid complexion and reddish hair, was admitted under the care of Mr. Hutchinson, at the Royal London Ophthalmic Hospital, on December 8, 1870. He came to know whether anything could be done to improve his sight, which had been much impaired by a severe attack of double iritis several years before. In each eye there were numerous old adhesions, which prevented the pupil from dilating more than very imperfectly with atropine. The iritis had occurred five years before, and he was then under Mr. Critchett's care; the eyes were inflamed for six months, the disease beginning a few days sooner in the right than in the left. The attack began in the month of March, when easterly winds were prevalent.

He denied all history of syphilis; was married, and had healthy children. He had no rheumatism during his attack of iritis, but ten years before that he suffered from what he called "rheumatic fever;" the attack was probably mild for it lasted only two weeks, and he was not aware that the painful joints were swollen; the rheumatism attacked his right side first. He stated that his mother had for some time been liable to rheumatism; the only part affected was her right hand, which was somewhat crippled and deformed from the disease. His maternal grandmother was laid up for twenty years by severe "chronic rheumatism, and was quite crippled by it."

CASE XXIX.—*Rheumatic Conjunctivitis Persistent for four Months in an elderly Lady, the subject of Chronic Rheumatism.*

Mrs. Handcock is a lady, æt. 60, who was sent to me by Dr. Cowan, of Bath, on account of intractable irritability of the eyes. It affected both eyes equally, and had lasted in spite of all sorts of treatment for about four months, and was somewhat paroxysmal. It had never risen to any high degree of severity, but had often been sufficient to prevent her making any use of the eyes. During the attacks the conjunctiva became much congested. At the time this affection commenced, Mrs. H. was

staying at Buxton with her sister, for the benefit of chronic rheumatic arthritis, from which both of them suffered. Their mother had also been subject to the same disease. There was no history of true gout in the family. The disease seemed of the same nature as that of Mr. Scott (to be detailed subsequently), although less severe, and less definitely paroxysmal. Mrs. H.'s rheumatism, although definite, is not very severe.

Case XXX.—*Recurrent Iritis—Three attacks within a year always affecting the same eye—No rheumatism.*

Mr. B. was brought to me by Dr. Bright, of Sydenham, in April, 1868, suffering from well-marked but not very severe iritis of the left eye. This was his third attack; the first was in May 1867, the second in August of the same year. In each case the left eye was the one affected. He was married, florid, and of sanguine temperament. He had never had gonorrhœa at any time, nor had he suffered from rheumatism. There was no apparent cause for the attacks of iritis. After his previous attacks, he had always completely recovered, and usually rather suddenly. In the two previous attacks, Dr. Bright treated him by iodides and counter-irritants, and when the disease was subsiding, sent him to the sea-side, which last measure seemed to benefit him greatly.

Case XXXI.—*Relapsing Rheumatic Iritis—Second Attack—History of Acute Rheumatism.*

Mr. G., æt. 34, a florid strong man, of sanguine temperament and red hair. In April, 1868, he came under my care for his second attack of rheumatic iritis; it was not a very severe one. Two years before, he was under me for his first attack of iritis in one eye; this was in the early spring months. It lasted about three weeks, and from that time to the date of his second attack, he had been quite well. This first attack was a very severe one, and for a fortnight he could see nothing. In boyhood he had rheumatism, and was laid up nearly a whole winter, since then he has had rheumatic pains in the feet repeatedly. He does not consider himself at present specially rheumatic, and on the whole has excellent health.

CASE XXXII.—*Rheumatic Iritis, with slight Articular Rheumatism and Sciatica.*

John Gothard, æt. 55, an engine-man, and much exposed to draughts, came to me in April, 1868, with slight iritis of the right eye, which had been present one week. He had, at the same time, pain in the right hip. He was under Mr. McMurdo thirty-five years ago with iritis of the same eye, and had at that time rheumatic "pains in the joints of his fingers and of his limbs." He has never been laid up with rheumatism, but the joints of his fingers are enlarged, and he appears to have had several slight attacks of sciatica. He is a florid, healthy-looking man. His father was not rheumatic, but was subject to a "severe scorbutic eruption." The facts of this case suggest that possibly the first attack may have followed gonorrhœa, but I have no note respecting it.

CASE XXXIII.—*Relapsing Iritis—Iridectomy in each at different times—History of Lumbago and Arthritis.*

Mrs. Holding, æt. 39. Has had repeated attacks of iritis in each eye. She attended at Moorfields in 1858, when Mr. Hulke did iridectomy in the right eye. In 1863 (November 19), Mr. Hutchinson performed the same operation on the left eye. She again attended in March 1868, with a fresh attack of iritis, and in February of the present year (1869) she came again, complaining of pain over the eyes, but with no definite iritis. She had an attack of lumbago five years ago, and has had rheumatic pains in some of the joints; on one occasion the right elbow was fixed for a time.

CASE XXXIV.—*Repeated Attacks of Iritis in a man subject to Rheumatic Gout.*

Wm. Greenstreet, æt. 41. Three years ago he had an attack of rheumatic gout, and was three months with it in St. Bartholomew's Hospital; at that time he had no inflammation of the eye, but four years before he had "a blight in the eye and a bad inflammation."

He came to Moorfields under my care, on April 2, with iritis of the right eye, a mild attack. He still suffers occasionally from

rheumatism. No history of syphilis; in early life he had a mild gonorrhœa, but nothing more. I ordered iodide of potassium, blisters, and belladonna fomentation.

A week later, the pupil was widely dilated and the congestion much diminished.

Case XXXV.—*Repeated Attacks of Iritis in a gentleman, the subject of Lumbago and Rheumatic Gout.*

Mr. H., a gentleman well-known on the turf, a free-liver, liable to lumbago, suffered repeated attacks of rheumatic sclero-iritis. They now lasted more than two or three weeks, and appeared to be relieved by iodide of potassium and colchicum. He finally died of disease of the kidneys, attended by albuminuria (? gouty). He was under the care of Dr. Fowler, of Bishopsgate-street.

Case XXXVI.—*Repeated attacks of Sclero-Iritis, occurring generally in autumn—Liability to Sciatica on one side only—First attack of Eye—Disease symmetrical and following a severe Febrile illness—Subsequent attacks unilateral.*

Mr. Jones, a dispensing chemist, had a severe illness in 1865, which was supposed to be typhoid fever. When he had quite recovered, both eyes suffered from slight sclero-iritis. For the latter he was under my care, and got quite well with iodide of potassium and Chian turpentine. He had been liable before this to severe attacks of sciatica.

In 1868 (October 21), he again came under care with the right eye inflamed. There was great congestion of sclerotic and conjunctiva (brick-red colour), considerable pain, but no great intolerance. The pupil acted somewhat, but was adherent at lower margin. The iris was very slightly discoloured. Mr. J. is a florid, robust man, accustomed to live well, and enjoying usually vigorous health. He has never suffered from rheumatism in any other form, but he has had repeated attacks of sciatica, always in the right side. His father and grandfather are both living, and neither is rheumatic.

Mr. J. tells me that for the last four years he has always in October had one or other of his eyes attacked, but several of the

attacks have been so slight that he did not consult me, but cured them by a few doses of iodide of potassium.

Case XXXVII.—*Acute Rheumatism with Double Iritis—Severe Relapse of both Affections—Iritis again after fourteen years of health.*

Patrick McCarthy, æt. 59, admitted in 1860 at Moorfields. Twenty-five years before he had had his first attack of iritis whilst in Guy's Hospital, suffering from general rheumatism. His eyes got quite well, but afterwards any attack of cold would cause them to inflame again. He was subsequently for twelve months in St. Thomas's and Guy's Hospitals for rheumatism and iritis; then the liability to both left him, and for fourteen years his eyes never suffered; at length, however, his left eye was again attacked, for which he now came under care. Both pupils were excluded, but dilated somewhat with atropine, and he could see fairly with each eye.

This man had, many years ago, suffered a severe attack of constitutional syphilis; he was treated by mercury to salivation, and after the disappearance of the secondary symptoms, he had never been reminded of the malady.

Case XXXVIII.—*History of Chronic Rheumatism and of Rheumatic Fever—Single Attack of Iritis.*

William Runciman, æt. 36, a sea-captain, admitted at the Ophthalmic Hospital, 1860, for a first attack of iritis in his left eye. He had never had constitutional syphilis, but there was a history of chancre and bubo fifteen years ago. For ten years he had been liable to repeated attacks of rheumatism, which had commenced in the first instance in consequence of exposure to extreme cold after shipwreck. Once he was laid up for a month with rheumatic fever, but his chronic pains appear to have been chiefly muscular.

Case XXXIX.—*Repeated Attacks of Iritis in One Eye only, without much damage to the Sight—Annual Attacks of Gout for Seventeen Years.*

John Thomson, æt. 63, a publican. At the age of 45, he had

his first attack of gout, and has had it once a year ever since. He is not aware that it is hereditary. The right eye only has suffered from iritis; its pupil is irregular. He has had attacks more o less severe every spring for many years. He had a doubtfu attack of constitutional syphilis thirty years ago.

CASE XL.—*Twelve Attacks of Iritis during Twenty Years, with persistent liability to Sub-acute Rheumatism.*

John Meriton, æt. 58, has both his pupils excluded by the effects of iritis. His first attack occurred twenty years before his admission at Moorfields, and it lasted nearly two months. Since that he has had a dozen others; they usually occur in the autumn, and are accompanied by great pain, affecting sometimes the right eye, sometimes the left, and occasionally both at the same time. He was under Mr. McMurdo's care in 1852 with the diagnosis of "corneo-iritis," when he attended one month; in 1858 he was under my own care with the diagnosis "acute iritis of the left eye, with slight hypopyon," when he attended three weeks. (These particulars are copied from old letters.) In spite of these repeated attacks, he still retains tolerable sight. The treatment has usually been by iodide of potassium and blisters.

For twenty years he has been liable to frequent attacks of sub-acute rheumatism, never severe enough to confine him to bed. He has had chancres several times, and has repeatedly taken mercury, but there is no evidence of his being the subject of constitutional syphilis.

CASE XLI.—"*Rheumatic Fever*," *followed shortly by Iritis, first of one Eye, then of the other.*

Henry Dowden, a tall, thin man, æt. 23, came first on May 17, 1869, with iritis of the right eye. The eye had been inflamed for a month. The left eye had been slightly inflamed at first. The *right* pupil was adherent everywhere, but of fair size. With atropine it did not dilate at all, nor did it become irregular. The iris was greenish and discoloured; there were no nodules of lymph, but ciliary congestion was present. It was already somewhat better, for he had "been blind for three weeks." About three months previously he had rheumatic fever; he was in bed

two weeks, confined to the house six weeks; he had been about again three weeks when I saw him.

He never had lumbago or sciatica, and this was his first attack of rheumatism. He was never ill before. Two years before I saw him, he had gonorrhœa, but no rheumatism after it, and there was no urethral affection when he came under observation at above date. No reason to suspect syphilis.

CASE XLII.—*Repeated Attacks of Gout or Rheumatic Arthritis (?), beginning at 40—Acute Iritis of one Eye, coming on directly after recovery from a Gouty Attack in a corresponding great Toe—Patient a free Wine Drinker—Gout in two Brothers, and in his Mother's relatives.*

Mr. K., æt. 45, is a traveller; he is thin, of dark complexion, and becoming grey. I treated him in August, 1872, for acute iritis of the right eye of ten days' duration. He had been suffering for about two months previously from gout in his right great toe. The eye inflamed two or three days after the toe had got well. He was at the sea-side when the eye inflamed, and the weather had suddenly changed to wet and windy.

He has been subject to rheumatism or gout (?) for four years. The first attack was in his legs; since then he has had it about four times, and usually in several different joints at once. It has never been quite bad enough to lay him up. There are decided lips on the condyles of his femurs. He knows that "rheumatic gout" is in his mother's family. He has two brothers, and both of them have had gout slightly. He himself is in the habit of always drinking half a pint of wine daily, and this although he finds that he is much better without it. Formerly he drank port chiefly, but of late chiefly sherry and claret; he drinks stout also. He states that his urine hardly ever gets thick.

CASE XLIII.—*Iritis, insidious and persistent, attacking first one eye and then, after several years' interval, the other—Vitreous opacities—History of Gout in relations.**

Mr. W., æt. 17, a clerk, rather stout, of fair complexion, was

* The following case has already been published in a clinical lecture on a peculiar form of iritis met with in the children of gouty parents. (See *Lancet*, January, 1873.)

sent to me by Dr. Ramskill, in May, 1870. He has gray irides. He is myopic $\frac{1}{16}$ in the left eye. He came to me for dimness of the *right*, which I found to depend on a striated floating opacity in the vitreous. I noticed also that the pupil did not act well, and that the iris was not of so bright a colour as the left. There was no history of injury.

In January, 1872, he again came complaining that the *left* pupil was not round, and that he had lately had occasional slight pain in the eyes, sometimes in one, sometimes the other. It had been worse in the left, but had never been enough to lay him up. I could find no positive adhesion in the left; the iris was active, though the pupil was not quite round.

I did him an iridectomy upwards in the right. A rim of pigment and new material remained behind on the capsule of the lens, and the whole pupil was found to be covered by thin membrane. The eye remained quiet after the operation. About two months later he noticed specks before the *left* eye, and some aching in it. I could find no opacities in the vitreous. The iritic adhesion had increased slightly. He could still read 1 J. with this eye, however, whilst with the right (operated) eye he could only see the largest letters. The iritis in the *left*, however, still advanced, and presently large thin gauzy opacities were found in the vitreous, obscuring the fundus very much. There was never any congestion, and but very little pain. Bright light was annoying, particularly to the right (operated) eye. Wishing to remove any fallacy as to the possible influence of nocturnal emissions, I made inquiries, and was told that some time back emissions had occurred, but not often, and that now they were very rare.

For several years he has had frequent attacks of pain in the joints of both great toes, and has also had attacks of lumbago coming on suddenly, so that he could not straighten himself.

His sister, a stout, florid young lady, now (1872) about 23, has had two attacks of congestion in the *left eye* in the early part of this year. She has been liable to rheumatic pains flying about her, and to sciatica, for several years. These symptoms have all occurred on her *left side*. She was once laid up for six weeks by sciatica.

This brother and sister inherit arthritic complaints from both parents. Their mother, a lady of very dark complexion, has

repeatedly and for several years had pain in the great toe joints, and sometimes in other joints. One of her brothers suffered frightfully from "true gout," and another brother had something like gout. The father of these three (the patient's maternal grandfather) also had gout.

The patient's father was liable to rheumatic pains, but had no gout. His father and father's brother (patient's paternal grandfather and great-uncle) suffered badly from gout, and the same is true of a cousin, Lady ——, on the father's side.

Case XLIV.—*Chronic, almost painless Iritis in one Eye at age of 32—Rheumatic Fever and Chronic Articular Rheumatism many years before the Iritis—Gonorrhœa several years after Rheumatic Attacks, and several years before Iritis—No Gonorrheal Rheumatism—No Syphilis—Gout in a Brother—No inheritance known.*

Edward R., æt. 33, has had one attack of iritis in his right eye; it was in March, 1871. He was in the house for two months, but had very little pain. He came to me in May, 1872, and then had a thin layer of false membrane over the right pupil, and was unable to count fingers with the eye.

At the age of 16 he had rheumatic fever, and three years later was again laid up with rheumatism in his knees. Three or four years after the second rheumatic attack he had his first and only gonorrhœa. It got well in about ten days, and was not accompanied by any rheumatism whatever. Has never had any form of syphilis. He is married, and has five children, reported to be in good health.

Neither his parents nor grandparents had, so far as he can ascertain, any form of arthritic disease, but one of his brothers, now aged over 50, has gout. He knows that one of his grandfathers died blind.

Case XLV.—*Three Attacks of Unsymmetrical Iritis in a man subject to Rheumatic Pains in the Joints—The Iritis acute, but remarkably free from pain—First attack of Iritis years before any Rheumatism or Venereal Disease—Father arthritic.*

Mr. H., æt. 33, is a florid, fair-complexioned, red-haired man. He has had three attacks of iritis, two in the right eye and one in the left. He came to me in March, 1872, for the third attack.

There were then all the signs of acute iritis, excepting pain. He said that in all the attacks he had been nearly free from pain. When I saw him, the anterior chamber was deep, and the eye was, perhaps, a little softer than the other.

The first attack of iritis occurred eleven years before I saw him, and before he had had either rheumatism or gonorrhœa or chancres. He was salivated for the iritis, and since then he has been liable to rheumatic aching in various joints. The second iritis occurred two years before he came under my care. Eighteen months before I saw him, he had gonorrhœa for the first (?) time, and a slight sore on the penis.

Mr. H. left off beer nearly a year before his last iritis on account of his rheumatism. He stated that twenty years earlier, his father had rheumatic gout in one hand.

Case XLVI.—*Painless Iritis in each eye in advancing life—Chronic Rheumatic Arthritis of Thumbs—Inheritance of rheumatism from father, and of gout from mother's family—Patient born when his father was past* 50.

Mr. F. C., æt. 55, has iritic adhesions in both eyes, but says that he has never had painful attacks of inflammation in them. He has disorganizing rheumatic disease of the carpo-metacarpal joint of each thumb.

He states that his father suffered much from rheumatism in the shoulders, and that a brother of his mother had gout. He is the youngest of his father's eleven children, and was born when his father was 52 years old. His father died at 72, and had had rheumatism as long as the patient can recollect. Mr. C. has seven children, and none of them have had rheumatism.

Case XLVII.—*Chronic Painless Iritis in one eye during pregnancy—Rapid and great variations in sight (Accommodative)? —Acute severe Iritis of the other eye soon after the confinement—History of prolonged articular rheumatism and of liability to rheumatic pains.*

Mrs. A., æt. 40, has had iritis once in each eye, with an interval of several months. The left failed first; she states that it was not congested, but the sight became dim, and especially that the degree of dimness varied very much at different times.

This was during her last pregnancy. It recovered after the confinement, and there is now only a single minute tag of adhesion. Two months after her confinement she came to me with severe iritis of the right; there was much ciliary congestion and circumorbital pain. She was highly hypermetropic, and so it is possible that the variations in the sight of the left eye may have been accommodative. She has black hair, dark complexion, and dark brown eyes.

In June, 1870, she had an attack of rheumatism, affecting her ankles, wrists, &c., and lasting six months. Some years ago she had rheumatic pains, which lasted all one winter. She attributed her arthritis to her having been much disturbed at night by her baby's illness. She does not know of any arthritic maladies in her relatives.

CASE XLVIII.—*Relapsing Sclero-Iritis in one eye only—Facial rheumatism—Inheritance of rheumatism.*

Mr. W. was sent to me by Dr. Clapton, on account of sclerotitis and iritis of his right eye. It was his second attack, the first having occurred a year before. He said that the pain in the eye was regularly recurrent every twelve hours, each morning and each evening.

He is subject to lumbago, and often has "brow-rheumatism," always on the right brow. His father suffers from lumbago.

CASE XLIX.—*Liability to relapsing unsymmetrical Iritis and to Lumbago—Chronic rheumatic arthritis of knees—Family history of rheumatic fever.*

Mrs. M., has had four attacks of inflammation in her right eye, and now has slender iritic adhesions and some pigment on the lens-capsule. Her left eye, in which there has been no iritis, is myopic, the right is not so.

She has been liable to lumbago for several years, and had an attack in September, 1871, after exposure to cold; once she was laid up for six or seven weeks by it. She sometimes has crackling in her knees, and on examining them I found condyloid lips. A sister of hers has had rheumatic fever.

CASE L.—*Gonorrhœa—Gonorrhœal Rheumatism—Numerous Attacks of Gonorrhœa—Rheumatic Iritis.*

Thomas Matthews, æt. 23, a sailor, of florid complexion and reddish hair, was under Mr. Hutchinson's care at the London Hospital, in 1863, for iritis and gonorrhœa. He had gonorrhœa for the first time in 1860, and after it a gleet which lasted a long time; he had no rheumatism or inflammation of the eyes after this gonorrhœa. In December, 1862, he again caught gonorrhœa (having been for some time previously quite rid of his former gleet), and very soon afterwards his eyes inflamed. For this attack he was under Mr. Hulke's care, and it would appear from the notes in his letter that he had true gonorrhœal conjunctivitis. About three months later (in March, 1863), and while he still had some urethral discharge, he began to suffer from rheumatism. The right hip and the articulation of his lower jaw were the parts first affected, but the sterno-clavicular joints, the knees, and the back also suffered, and severely; for three weeks he was so bad that he could scarcely sleep. During 1863, after his first attack of inflammation of the eyes, he had thirteen or fourteen distinct attacks of iritis. On November 27, 1863, Mr. Hutchinson's notes state that "he is now just recovering from a severe attack of gonorrhœo-rheumatic iritis in the right eye. He had intense pain in the eye, swelling and discoloration of the iris, but no effusion of nodules of lymph. There are adhesions in this eye. He still suffers much from 'rheumatic pains' in his head and spine. He still has some gleet."

CASE LI.—*Iritis with Rheumatic Pains during Gonorrhœa—Hereditary History of Gout in two Generations.*

John Porter, æt. 22, unmarried, with dark hair and blue eyes, was admitted under Mr. Hutchinson's care at the Royal London Ophthalmic Hospital on December 5, 1870, suffering from iritis in his left eye. The attack began a week before he applied, and was the first of its kind which he had experienced. He gave a history of some conjunctival inflammation (probably catarrhal ophthalmia) in childhood, which lasted for several weeks. On admission, the left eye showed great conjunctival and ciliary congestion, and patches of echymosis were seen on the conjunctiva. The cornea presented a patch of cloudiness at its lower part and

slight haze in other parts; the pupil dilated nearly round under atropine, so that some doubt was felt as to whether he really was suffering from iritis. Three days later, however, there was a well-marked adhesion between the iris and the lens capsule; the haze of cornea had increased.

At the time of admission he had a slight discharge from his urethra (admitted to be venereal) which had been present two or three weeks, and had therefore preceded the iritis; it was, however, so slight that he had taken no notice of it. About the time when the eye began to inflame he had had some pain in the left side of his neck and in his right shoulder. Two years previous he had had his first gonorrhœa; it was severe, and he used injections for it; he had no inflammation of his joints or eyes then. He had never had a chancre.

Beyond the above-mentioned rheumatic pain accompanying his iritis and second gonorrhœa, he was not aware of any arthritic symptoms in himself. His paternal uncle (a warehouseman, and accustomed to the free use of beer) had suffered for six or seven years from gout in his hands and feet; the attacks were described as coming on suddenly, and being attended by pain and swelling. His paternal grandfather (a hotel keeper) was believed to have suffered from gout several times, but no positive history could be obtained. The patient's father had had no arthritic symptoms, though he was a traveller, accustomed to live well and drink beer. The patient believed that he resembled his gouty uncle in face more than his father.

Case LII.—*Gonorrhœa—Rheumatic Pains—Double Iritis.*

Mr. R., æt. 21, a clerk in the city, contracted gonorrhœa in July, 1870; it was his second gonorrhœa; he had not had syphilis; he was not rheumatic.

After he had been under treatment for two weeks he had aching in some of his joints, and his eyes inflamed. His medical attendant considered that he probably had "gonorrhœal ophthalmia," but expressed some doubt on the matter; "strong drops" were ordered, which gave great pain when used. I was sent for about a week after the eyes had inflamed. The right had inflamed first, but subsequently the left became the worse. The conjunctivitis had much subsided, so much so that Mr. Tay, who first saw him, came to the conclusion that it was gonorrhœo-rheumatic

iritis rather than gonorrhœal conjunctivitis. The symptoms at the first visit were intense pain in and around the globes, especially the left, extreme intolerance of light, much congestion of sclerotic, chiefly in the ciliary region, some swelling of the lips, and mucous discharge; the iris looked muddy, but was inspected under difficulties; with the left eye he could not see my hand. At the next visit, two days later, the left pupil was widely dilated, and there was a ring of pigment deposits on the anterior capsule; he could see to count fingers. The gonorrhœa continued profuse while the eyes were inflamed and for some weeks after they were better.

The occurrence of double iritis suggests the possibility of syphilis accompanying the gonorrhœa in this case; I think, however, that the iritis was rheumatic, and not syphilitic, for the following reasons:—1st, the patient had no other symptoms of syphilis, neither chancre nor rash, throughout the attack; 2nd, the iritic element in the inflammation was slight and transitory, there were no nodules of lymph and no tough adhesions; 3rd, rheumatic pains ushered in the attack of ocular inflammation; 4th, the pain in the eyes was much more severe than it usually is in cases of syphilitic iritis. Neither was it a case of gonorrhœal ophthalmia, for there was never any swelling of the ocular conjunctiva, and but little of the palpebral conjunctiva. The very considerable diminution of sight suggests the possibility of the vitreous having been cloudy during the attack, since neither the cornea nor aqueous were altered, and the iritic adhesions were but slight.

In January and February, 1872, this patient had another attack in his right eye. It was chiefly of the nature of cyclitis, and was attended by great pain and irritability, but no positive iritis.

Case LIII.—*Gonorrhœo-rheumatic Iritis—The Iritis occurring during the Attack of Gonorrhœa and with Lumbago, &c.*

George Brownjohn, æt. 27, was a patient at Moorfields in April, 1868. The first time he applied "sclerotitis" was diagnosed, but three days later he had decided iritis. The iris was thickened in all parts, and muddy. Its pupillary edge adhered everywhere, but no lymph was seen in the pupil, nor any nodules in the iris. I took it for syphilitic iritis, and on inquiring

whether he had had venereal disease, he at once answered in the affirmative. On examination, however, I found that he had gonorrhœa only. There was great congestion of the conjunctiva, by which the ciliary zone was concealed. He had suffered much pain, but had not much intolerance of light. I had him stripped, and no rash whatever was to be found, nor had he any sore throat. There was a discharge of thick pus from the urethra, but no signs of chancre either within the urethra or in the penis. He denied having ever at any former time had any kind of venereal disease.

As to rheumatism, the facts were as follows:—He had never formerly been liable to rheumatic pains, but for the last fortnight had suffered much from pain in the back of the right hip, passing down the back of the thigh (sciatica). This pain had been present for a week before the iris inflamed. His urine was reported to be thick and high coloured. The gonorrhœa had been present one month.

CASE LIV.—*Gonorrhœo-rheumatic Iritis—Two attacks of Iritis—Two attacks of Rheumatism.*

Wm. Morris, æt. 33, under Mr. Streatfeild's care at Moorfields, in March, 1863, with iritis of the right eye. This was his second attack; the first was exactly a year ago, and passed off completely. The present attack is a mild one, and there are no nodules of lymph; he also complains of rheumatic pains in various parts, especially in one knee joint. He has had gonorrhœa four times, and since his first gonorrhœa he has suffered twice from rheumatism, and was laid up for three weeks by one attack in the knees and hips. He never had rheumatism before his first gonorrhœa. He has never had syphilis. It is doubtful in this case whether the gonorrhœa is in causal relation with the rheumatism.

CASE LV.—*Gonorrhœal Rheumatism—Relapsing Iritis—Twenty Attacks—Great damage to the Eyes.*

William Webb, æt. 45, came under my care at Moorfields in 1861. He was of sanguine temperament, but pale and sallow. Excepting his liability to rheumatism and to iritis, he considered that he had enjoyed good health. He had never had syphilis.

In early life he had two attacks of gonorrhœa, and nine months after the second both his eyes inflamed. He was suffering from rheumatism at the time, and the rheumatism had begun within a few weeks of the attack of gonorrhœa. Neither of his attacks of gonorrhœa lasted more than a week or two, and both were uncomplicated. He was treated for his first attack of iritis by Mr. Babbington, in St. George's Hospital, who considered it rheumatic. After the first attack of iritis he remained well only three or four months, when a relapse occurred. He has, on the whole, had twenty attacks, and has usually suffered most during the month of March. Until 1846 he did not experience any material injury to his sight, but an attack during that year was treated without belladonna, and on recovery from it he found his sight much impaired. An attack in the following year damaged his sight still more. Three or four years ago he was obliged to give up his occupation as a draper on account of his defective sight.

The state of his eyes when he first came under my observation was as follows:—With the *right* he could see shadows, but nothing more; the pupil was not larger than a pin's head, and was closed by false membrane; the iris was bulged forward by effusion behind it, and its structure was much altered by stretching. The *left* pupil was excluded and occupied by false membrane, through the centre of which was an aperture sufficient to allow him under favourable conditions to just manage to read.

It seems very probable that in this case the rheumatism was gonorrhœal. He was not aware of either rheumatism or gout in his family. The damage to the eyes had been unusually severe.

Case LVI.—*Persistent eyeache, in connection with rheumatic arthritis—Arthritis and Gout in patient's mother and maternal uncle—Rheumatic Fever in her daughter—Peculiar Cataract (? Urate of soda) in another daughter.*

Sarah E., æt. 48, is under care for a persistent and very troublesome aching pain in the eyeball; the pain varies in intensity, but is scarcely ever quite absent; she has suffered from it for eight months. It sometimes affects the right side of

the forehead, nose, and occiput; never the left side. She is highly myopic, rather more so on the right side.

She is subject to occasional "rheumatics" in the knees, &c. There are small lips on her femoral condyles.

Her mother (now 85 years old) has had "rheumatism" in her thumb and legs, and her knees have for a long time been so "weak" that she requires help in walking. Her mother's brother died of gout after suffering from it for 20 years. Her youngest daughter has had rheumatic fever (with swollen joints). Her eldest daughter is under Mr. Streatfeild's care for incomplete cataract; the lenses show numerous striæ, and a number of small round opacities apparently distributed all through the lenses. The right is more advanced.

Case LVII.—*Recurrent iritis in a gouty man—Gout hereditary for two generations on father's side, and confined to males.*

Henry J., æt. 62. During the last 30 years has had many attacks of iritis, chiefly in the right eye. For 35 years has been subject to gout; almost all his joints have suffered. Has lips on femoral condyles and grating in his knees, and gouty concretions in his ears and eyelid. His father, his father's father, some of his father's brothers, and male cousins, have all suffered from gout. He has no brothers, but his sisters are all free from gout. He knows of no female relations who are gouty.

Case LVIII.—*Rheumatic arthritis on mother's side (mother's brother); rheumatic arthritis and unsymmetrical iritis in her daughter.*

Mrs. C. aged 67. Has had one attack of iritis in her right eye. Is liable to neuralgic pain in the top of her head. Was laid up many years ago, for a month, by rheumatism, and has often since then had slight attacks in her knees. There are abundant loose bodies in the knees; the left grates decidedly, and there are lips on the edges of the condyles.

She has been for many years subject to severe sick headaches. Brown hair, blue irides, sallow skin.

Her mother's brother was confined to his bed for eight years by rheumatism.

Case LIX.—*Rheumatism in mother's mother; rheumatism, neuralgia, and glaucoma, in mother's daughter—Transmission to same sex.*

Mrs. C., æt. 44. Has her vision very much impaired by chronic painless glaucoma in both eyes; her discs are deeply cupped.

She has suffered a good deal from pain, sometimes definitely one-sided, in the face and head, and from what she calls "rheumatism" in her hands and legs; there has never, however, been swelling of joints. She has been liable for many years to occasional sick headaches.

Her mother's mother suffered severely from rheumatism.

Case LX.—*Cyclitis and Sclerotitis in a Rheumatic Man.*

John L., æt. 32. Has suffered for nearly a year from a chronic symmetrical cyclitis and sclerotitis (worse in the right eye), ending in thinning and slight staphyloma of ciliary sclerotic.

Several years ago he had rheumatism (probably rheumatic fever), and he has since then been liable to rheumatic pains in various parts. No family history of arthritic complaints. He has had ague.

Dark hair, but little whiskers; light gray irides.

Case LXI.—*Severe Rheumatism in Father—Rheumatic Pains and Unsymmetrical Keratitis in Daughter.*

Sarah J., æt. 53. Under care for a very chronic attack of keratitis punctata in the right eye. The case has been remarkable for the frequent relapses of pain and ciliary congestion which have occurred.

She is liable to pains in her joints, but has never been laid up by rheumatism. Her father was crippled by rheumatism.

Case LXII.—*Rheumatic tendency transmitted by father to two sons, and appearing in Joint and Ocular Affections.*

John M., æt. 42. Under care for three months on account of kerato-iritis of his left eye only, with much superficial disturbance (ulceration) of cornea, leading to diffused permanent opacity. The same eye has been inflamed a year ago.

He had pains in his loins and knees at the time his eye inflamed the second time. His brother is rheumatic, and has

had some inflammation of his left eye. His father is subject to rheumatism.

The patient had some chancres some years ago, but there is no evidence of constitutional symptoms having followed.

CASE LXIII.—*Rheumatic Arthritis in mother—Rheumatic Fever, Sciatica, and Acute Glaucoma in daughter.*

Sarah B., æt. 50, was admitted on account of very acute glaucoma of the left eye, which was relieved, and vision considerably improved by iridectomy.

Her arthritic history was to the effect that she had rheumatic fever (with swelling of the joints) at the age of twenty years, and that latterly she had had very severe and localized pain over her right shin bone; "her thumb would have covered the place." Her mother suffered from chronic rheumatism. There was no history of gout.

CASE LXIV.—*Arthritic Neuralgia and Lumbago in father; the same Neuralgia with Joint Pains in two daughters; and Recurrent Iritis in one of them.*

Emily M., æt. 20. Has had recently an attack of inflammation in right eye, and now has iritis in the left, accompanied by much pain. There is no evidence whatever of syphilis. These attacks were in winter.

She is subject to pain in her left shoulder, aching in her knees, and lately to aching of the same kind in her right hand. She also suffers at times from neuralgic pains in both sides of her head. She is "bilious," *i.e.*, liable to nausea and frontal headache.

Her father has lumbago so badly as to be sometimes laid up by it; he also has neuralgia in his head. Her sister has the same neuralgia and rheumatic pains as she has.

Patient has been a barmaid for five years, and is exposed to damp and draughts a good deal.

CASE LXV.—*Arthritic tendency transmitted from mother to son—Rheumatic Iritis, &c., after repeated attacks of Rheumatism in son; all following Gonorrhœa, and perhaps Syphilis.*

Joseph K., æt. 35. Has been often the subject of rheumatism

"in the muscles," and without swelling of joints, since he had gonorrhœa, but he believes never before. Has had gonorrhœa several times, and has had rheumatism at the same time. There is no definite history of constitutional syphilis, though he had a chancre and a doubtful sore throat seven years ago.

For about a year he has been suffering more or less from iritis, first in the right and then in the left eye. Part of this time he has had rheumatism. He has during the same time had a profuse balanitis, and he is under the impression that this symptom comes on spontaneously in connexion with his rheumatism. The iritis has gone on to completely destructive inflammation of all the tunics of the right eye, and the left is nearly blind. His mother had rheumatism in her hips and elsewhere.

CASE LXVI.—*Gout in paternal grandfather; Gout and Kidney Disease in grand-daughter.*

Amy N., æt. 37. Is under care on account of atrophy of the optic disc with diminution of vessels in her right eye, and hæmorrhages into the retina and vitreous in her left. The defect of the right is of only a few weeks' duration; that of the left 12 months.

She has dark brown hair and eyes. She has had an attack of gout in her great toe (was laid up by it), and several times has had pain in it. She is very liable to severe sick headaches, chiefly on the right side. She drinks bitter beer freely. Her urine contains casts, but no albumen. Has never had any rheumatism.

Her father's father had gout. She inherits her sick headaches from her mother.

CASE LXVII.—*Gout in father; Gout, Relapsing Irido-cyclitis; and Neuralgia in daughter.*

Mrs. D., æt. 52. Has had many attacks of irido-cyclitis in both eyes, the left having suffered earliest and most severely and being now quite blind, with increased tension and closed pupil. Both eyes have never been inflamed at the same time. The first attack was eight years ago.

Before her eyes inflamed, and since then, she has had many definite attacks of gout in her left great toe. She is also subject to bad neuralgia in different parts.

Her father had gout in his feet.

Case LXVIII.—*Recurrent Facial Neuralgia and Unsymmetrical Iritis in a rheumatic woman.*

Mrs. B., æt. 32. For years has been liable to attacks of neuralgia in her face, lasting generally only a few days. Her last attack of facial neuralgia was unusually prolonged, lasting eight weeks, and being followed by iritis on the same side (the right) as the neuralgia. The iritis has been accompanied by pain at the back of the head, but the facial pain has quite left her. Dark hair, brown irides.

Several years ago was laid up by rheumatism in her hips; "has had none in her knees," but there is crackling in the right knee, and there are small lips on her femoral condyles. No known family history of arthritis, but she does not know many of her relations.

Case LXIX.—*Arthritic Neuralgia in father; the same, with slight Joint Affection, in daughter, with well-marked Iritis in connexion with Syphilitic Keratitis—Influence of the Arthritic Diathesis on the Heredito-syphilitic Eye-affection.*

Mary Anne M., æt. 27, has in a marked degree the physiognomy characteristic of inherited syphilis; she is an only child. She now suffers from an attack of well-marked iritis, with interstitial keratitis in her right eye, and in the left there are widespread but slight choroidal changes.

She often has pains in her joints when she gets cold, and is subject to "sciatica in her leg and shoulder." Her father suffers from sciatica.

Eliza R., æt. 46. Suffers from neuro-retinitis, with hæmorrhages and white deposits in the retina; her urine is not albuminous, but contains casts. The ocular changes began and are more advanced in the left eye. She has suffered from what she calls "rheumatic gout" in the joints of her right upper extremity, and in her knees, to a less extent, for fifteen years; the attacks are often accompanied by a good deal of swelling. She has occasionally had sharp sudden pains in her back, making her loins stiff ("lumbago"). She is liable to stiff necks. Formerly she suffered much (during pregnancies) from severe toothache, often in sound teeth. Complexion sallow, hair dark, irides grey. No family history of arthritis known, but she does not know all her relations.

There is grating in, and much thickening about her knees, and probably lips on the condyles.

CASE LXX.—*Inheritance and Transmission of Arthritis and of Arthritic Eye Symptoms.*

Mrs. J., æt. 72. For twenty-three years liable to "rheumatic gout" in various joints; the attacks came suddenly, and are accompanied by redness, shining, and swelling. In the first attack, she was laid up for several months.

The joint inflammations have often been preceded for a short time *by attacks of intense pain in the eyes without impairment of vision.* Formerly she had severe sick headaches.

She has lived freely, drinking beer and port-wine. She now has *grating, lips, and false cartilages in her knees*, and corresponding changes in other joints; *xanthelasma* of left eyelid; *hæmorrhagic retinitis* of left eye; casts (but no albumen) in urine. No signs of past iritis. Her mother had "rheumatism" in her shoulders and "in her teeth;" her son's daughter is the subject of the next case.

CASE LXXI.—*Relapsing Iritis in a patient who had syphilis many years ago, and inherits an arthritic tendency.*

Mrs. B., æt. 29. Has had three attacks of iritis in her left eye within the last two years, all of them in winter. Has had occasional "rheumatic pains" for several years, and before the first iritis she had severe neuralgia on the left side of her face.

She had syphilis (rash and sore throat) fifteen years ago, but at that time no inflammation of the eyes occurred. She now has tertiary ulcerations on the left side of her scalp.

CASE LXXII.—*Gout in mother—Slight Rheumatism, Neuralgia, and Relapsing Glaucoma in daughter.*

Sarah H., æt. 23. Is under care on account of glaucoma in her left eye; it has relapsed after a free iridectomy, and a second operation has been performed. The glaucoma has been chronic. She has been, since the age of 10, subject to severe sick headaches. She has also been subject for some time to neuralgia in connexion with carious teeth. Both eyes are extremely myopic,

the right has for many years been nearly blind, and its disc is now atrophied.

She considers herself slightly rheumatic in her joints. Her brother has slight rheumatism. Her mother has "chalk-gout," and formerly had severe headaches.

CASE LXXIII.—*Gout inherited by the youngest child—Pain in the eyes in connexion with Gout.*

William B., æt. 51. Is subject to attacks of gout, and suffers from "darts of pain through the middle of each eyeball" in connexion with his gouty paroxysms. These pains are generally confined to the eyeballs, but sometimes they cross the bridge of the nose. He never has the pain except when he has gout.

His father suffers severely from gout, and his father's five brothers all suffer from it. The patient is the youngest born of his father's children. He has drunk beer from childhood.

CASE LXXIV.—*Gout in mother—Scarlatinal Rheumatism in children.*

Mrs. B., æt. 62. Is under care for renal retinitis which affected the left eye first, and subsequently attacked, in an exactly symmetrical manner, the right. She has albuminuria. She has been liable to attacks of gout for twenty years. She states that those of her children who have had scarlet fever have suffered from rheumatic fever afterwards.

CASE LXXV.—*Gout in father—Recurrent Iritis and other recurrent symptoms in son.*

William Y., æt. 54. Has had attacks of subacute iritis several times within the last six years; the right has suffered most, and is all but blind. He has had no definite joint disease, but slight "rheumatic" pains in various parts. Has been, since boyhood, very liable to epistaxis, and to violent sick headaches, and to indigestion. He has nearly black and rather coarse hair; and is getting bald on the vertex. His teeth are carious. His father was often laid up by sudden attacks of gout in his feet.

CASE LXXVI.—*Transmission of Arthritic Diathesis to two generations, from father to daughter, and daughter to son—Gout, sciatica, and recurrent iritis, and rheumatic fever, in different members of the same family.*

Mrs. A., æt. 51. Has had two attacks of iritis in her right eye within the last six months; there has been very little pain. She is subject to shooting pains down the backs of her thighs and legs. Two years ago she had an eruption of herpes frontalis on the left side, and she often has a crop (as she now has) of herpes on the end of her nose during a cold. She is florid and has dark hair.

Her father had well-marked gout, and her son has had rheumatic fever. She says that she resembles her father, and that her son resembles her more than his father.

CASE LXXVII.—*Occurrence in the same patient of Gout, Rheumatic Fever, and Chronic Rheumatic Arthritis, with (later in life) numerous attacks of recurrent Iritis—Gout in a paternal ancestor.*

Wm. T. M., æt. 50. Has had about six attacks of iritis; they have always been unsymmetrical, sometimes one eye being attacked, sometimes the other. They almost always occur in January. He first suffered at about the age of 22.

He has been subject to well-marked attacks of gout since he was 7 years old: the first was in his right foot. He has had no gout attacks since he was 35. This freedom during advanced life is probably due to his having drunk nothing but gin-and-water since he was 22.

He has had three attacks of rheumatic fever; the first came on after he got wet on a hot day. His first attack of eye-inflammation occurred with the rheumatic fever. "The doctor used to listen to his heart." The last rheumatic attack was at the age of 34 (*i.e.*, about the same time as the gout ceased). Respecting the character of the rheumatism, he says that he was sometimes laid up for many months by it, and that his joints swelled but did not become shining as he was accustomed to see them in gout.

His later attacks of iritis have not been associated with any joint symptoms.

His father's father had gout severely, but his father and all other relatives are believed to have been free from both gout and rheumatism. His father was a "brass-founder," and the patient is the same; "brass-founding," he says, includes working in lead, copper, and arsenic. He has never had symptoms of lead poisoning.

Patient has some grating in his right knee, and there are three (probably) small lips on the condyles.

Case LXXVIII.—*Several Attacks of Rheumatism and Unsymmetrical Iritis during corresponding Attacks of Gonorrhœa—At a later period, Iritis with Sciatica, without Gonorrhœa—Mother slightly rheumatic.*

George D., æt. 27, a single man, had rheumatism for the first time during his first gonorrhœa, at the age of 20. At the same time his left eye inflamed for the first time, and afterwards the right eye. He was, during this illness, under Dr. Page's care at St. George's Hospital, where the diagnosis of "gonorrhœal rheumatism" and "rheumatic iritis" was made. Since the above date he has had three or four attacks of gonorrhœa, and with each gonorrhœa he has had rheumatism and inflammation of one eye. He now comes under care for his fifth attack of iritis. It is in his left eye, and he says that of the five only one has been in the right; he has no gonorrhœa now, and has had none for about three years. Besides the iritis, he now suffers from sudden attacks of severe pain at the back and upper part of the right thigh; it "makes him feel as if he should fall." The present attack of iritis has not been accompanied by much pain. He states, with regard to the rheumatism, that almost all his joints have been affected at one time or another, but that his right side has on the whole suffered more severely than the left, the reverse of what has happened to his eyes.

The diagnosis of the cause of his iritis is made more difficult by the presence on his legs, arms, and abdomen of a rash, consisting of dull maculæ. It may be the remains of a syphilide or of common psoriasis. He says it has been present eighteen months, and that he never had a rash before. Whether or not he had syphilis two years ago or thereabouts does not matter much, since his earlier attacks of iritis occurred more than two years ago, and in association with gonorrhœal rheumatism.

His mother, who is 45, has had "rheumatism" in her hands twice; "she caught it at the seaside."

Case LXXIX.—*Ten annual attacks of Unsymmetrical Iritis always in the same Eye, and probably located in it by over-use —The Iritis always occurring in Spring time—Patient suffers from severe Facial Rheumatism—No known Family History of Arthritic Diseases—Syphilis without Inflammation of Eyes* 14 *years before first attack of Iritis.*

A medical friend has had six attacks of iritis within the last ten years. They have all been in the right eye, and the left has never suffered. The iritis always occurs in or about the month of March; it is accompanied by intense pain and great photophobia. Each attack lasts about three weeks, and is followed by complete recovery; so that now, after his sixth attack, the right eye is still better than the left for microscopical purposes.

Dr. Z. has suffered much from facial rheumatism, and for a long time he limped about lame with sciatica. He has had no other form of arthritis, and states that, so far as he knows, gout is not in his family.

Dr. Z. believes that the iritis has been located in his right eye in consequence of his having used only that eye for microscopical work, of which he has done a great deal; he has never used the left eye for this purpose.

Fourteen years before his first iritis Dr. Z. contracted syphilis, from a chancre on the finger, during his attendance on a midwifery case. He had no well-marked secondary symptoms, and no affection at all of the eyes. For the next 10 years, however, he suffered more or less from palmar psoriasis (symmetrical), and occasionally from other tertiary symptoms; but all signs of syphilis wholly disappeared after a course of mercurial baths four years before the iritis began.

Although the iritis in this case has occurred in an arthritic subject, it may perhaps have been to some extent influenced by his syphilis, for great benefit has several times seemed to follow from large doses of iodide of potassium, and once from the administration of mercury to slight salivation.

Case LXXX.—*Slow painless unsymmetrical Kerato-iritis (Keratitis Punctata), in a woman, æt. 49, who has been subject to Chronic Rheumatism since girlhood — Sick headaches and various nervous symptoms since puberty—Hereditary history of Rheumatism and of Skin Disease—Patient possibly Syphilitic after marriage.*

Mary Anne W., æt. 49, suffers from well-marked keratitis punctata of her right eye only; the dots on the posterior lamina are chiefly at the lower part. The iris has a slightly greenish tint, but shows no undoubted signs of present or past inflammation. The opposite iris is of a bright brown colour. The tension is slightly increased. The eye has been failing for about 12 months. She has had neither pain nor redness in it. It is her first attack. She has dark hair, brown irides, and a sallow complexion.

Since girlhood she has suffered from rheumatism. Her right shoulder was the first part attacked (and is still oftenest affected), and since the left wrist and both knees have suffered; her feet also sometimes get stiff and painful. Since the age of 16 she has been subject to sick headaches, with vomiting; of late years she has several times had attacks of temporary dimness of sight, lasting a few minutes, and of numbness in her hands and feet. She never had jaundice, and has no xanthelasma.

There is no evidence of inherited syphilis in her physiognomy or teeth. With reference to tertiary acquired syphilis, however, there is suspicion, though no conclusive evidence. She has had five children: one was born dead, one died a few hours after birth, and another at 14 months. The remaining two do not appear to have shown suspicious symptoms.

The patient's mother suffers from "rheumatism" in her back; and her eldest living child, a boy of 10 years, is attending at the hospital for skin-diseases on account of an eruption, which, from the mother's description, is probably psoriasis.

Case LXXXI.—*Iritis in one eye, at the age of 48, in a woman who is very probably the subject of latent Syphilis from Conception —Family history of Rheumatism and Gravel—Various nervous symptoms and a Skin-eruption in the patient, all probably in connexion with the climacteric period.*

Mrs. W., æt. 48, came under care for iritis, of only a few

days' duration, in her right eye; it was accompanied by severe pain and by ciliary congestion. The sight of this eye had been failing for the previous 12 months, and on examination striæ were found in the lens. She had never had inflammation of either eye before.

She has had occasional pains in her loins, but no other symptoms which at all pointed to an arthritic tendency. Menstruation ceased two and a half years before she came under care, and since that time she had noticed that her memory was failing (she stated this voluntarily), and she had become liable to frequent attacks of what she called "hysteria." The following is her account of such an attack:—For a day or two she feels out of temper and has a bad taste in her mouth; then comes a feeling "of coldness all over," accompanied by laughing and crying, and lasting perhaps 24 hours. After the cold fit is over she becomes "feverish" and goes to bed, but does not sweat. This "fever" often lasts as much as three weeks. Soon after it begins the *right* leg swells and becomes red and hot, and red patches appear on the skin; her account of this eruption is indefinite, but it is probably eczematous, for when she came under care she had recently had such an attack in the right leg, and for the first time in the left also, and there were stains remaining just like those left by eczema. She also describes a feeling of "numbness," which "takes her all down the right side" during these attacks.

She has had very good health in other respects, and no history of syphilitic symptoms can be obtained, but her children are in all probability syphilitic. She has had 13 pregnancies; several ended in miscarriages, and several children died at about 12 months; the three living ones all had "thrush," but none have had suspicious symptoms since infancy.

Her father suffered from "rheumatism" in his arms, and he died of "gravel." The patient knows of no other arthritic history and of no history of skin-diseases, but she does not know all her relations.

Case LXXXII.—*Several attacks of Chronic Iritis in the same eye at an early age, and ending in exclusion of the pupil—Family history of Gout and Rheumatic Fever.*

Mrs. W., æt. 22, married three years, has dark hair, blue

irides, and pale complexion. She has had four attacks of iritis in her right eye since the age of 16, and a single mild attack in the left at the time when the right was last inflamed. During the earlier attacks she was under the care successively of Mr. Crichett and Mr. Jabez Hogg. The pupil of the right is excluded and the iris bulged forwards. The attacks have generally begun about October, and persisted with varying severity till April or May; sometimes there has been much ciliary congestion; pain has not usually been a prominent symptom. The first attack occurred three years before marriage.

She herself has had no arthritic symptoms, if we except slight aching in her left shoulder. She has two brothers, one of whom (who, like herself, has dark hair) has had rheumatic fever severely. Her father, who was a physician, suffers from gout in his feet. He is known to have drunk very freely. The patient is said to be "exactly like her father" in features and colour of hair.

With regard to syphilis, there is no evidence that the patient has shown any symptoms of it, although it is highly probable, from her account, that her two children are syphilitic. She has been pregnant twice: the first child, a boy, died at the age of one month of "thrush," and he had an eruption on the buttocks; the second, a girl, is living; she had thrush, but no eruption.

The patient had, it is true, one of her iritic attacks (the third) soon after her second confinement; but seeing that her first attack was three years before marriage, that the first three attacks were unsymmetrical, and that a strong family tendency to arthritis exists, we need feel no hesitation in ascribing her iritis to the arthritic diathesis.

Case LXXXIII.—*Kerato-Iritis of one eye in a man whose male relations are rheumatic, and himself probably slightly so—The attack attributed definitely to cold—History of an eye disease in his rheumatic brother.*

John M., a stoutly-built, florid livery-stable-keeper, æt. 42, applied on account of kerato-iritis of one week's duration in his left eye. There was then (January 16) intense conjunctival congestion, a large surface of very superficial ulceration at the centre of the cornea, and white interstitial deposits in it; the iris

was discoloured, and adherent at several parts to the lens-capsule. The cornea afterwards became superficially vascular, and after the vessels disappeared, extensive opacity of cornea still remained. The attack was accompanied by considerable pain at first. He had pain in his loins and knees at the time when the iritis began, and he attributed the whole attack to a "cold," which he thought was caused by having had his hair cut a few days before. He stated that he had an attack of inflammation in the same eye about a year before the one for which he came under care; but it lasted only a few days on the first occasion.

The patient has lived freely in regard to alcoholic drinks, but has never had gout. There was no evidence that he had ever had constitutional syphilis, though he admitted having had some "little sores" many years before. He stated that his father and his brother had both suffered from rheumatism, and that the brother had also had something amiss with one of his eyes.

Case LXXXIV.—*Recurrent Iritis in a slightly arthritic woman—Gout and hemiplegia in her father, and rheumatic fever in her son—Herpes frontalis and repeated attacks of symptomatic herpes in the patient—The herpes frontalis on the side opposite to her iritis, and on the same side as her father's hemiplegia.*

Mrs. A., a widow, æt. 51, had her first attack of inflammation in the right eye in August, 1870, and the second in December and January following. She came under my care on January 5, 1871, and then had well-marked iritis in her right eye, with numerous but not very tough adhesions. She was well in three weeks, and neither this nor the former attack were attended by much pain.

My attention was attracted to some scars on the *left* side of her forehead, chiefly in a vertical line at the middle of the left forehead, evidently left by an attack of herpes frontalis. She stated that the eruption came out two years before I saw her, and soon after the final cessation of the catamenia. She said that there were no spots on the nose or face, and that the eye was not affected. The eruption was probably not copious, and was not followed by either pain or numbness. It is curious and interesting that she is also very liable to crops of symptomatic herpes in connexion with colds; these eruptions do not specially affect

one side, but they are peculiar in usually appearing on the end and ala of the nose, and *not on the lips*. This is her own account, and was borne out by the presence of such a patch on the *left* side of the tip and ala of the nose in connexion with a "cold," at her last visit.

This patient is liable to shooting pains in the backs of her thighs and legs (sciatica), and to occasional stiff neck, but not to any other arthritic symptoms; unfortunately I did not examine her knees. She considers that her health has been good, except a liability to frontal headache, with vomiting, which began in early girlhood, and has entirely ceased of late years.

Her father, who was an independent gentleman, suffered from gout; he had several "fits," and finally died in one of them. He was paralysed on his left side. The patient's son (the only son out of four children) has had rheumatic fever.

The patient is stout and florid; she has dark hair and brown irides. She states that she "takes after her father," and that her son resembles his mother more than his father.

Case LXXXV.—*Chronic Ciliary Sclerotitis in a man who formerly had rheumatism severely, and still suffers from it in a less severe degree.*

John L., æt. 32, formerly in the East India Company's Service, now a ticket collector, came under care on account of conjunctival and sclerotic congestion, chiefly in the ciliary region; it was noted that there was but little mucous discharge. A week later there was some superficial vascular ulceration of the upper part of the left cornea. The inflammation had come on gradually for about a month before he applied, and was at first attended by a good deal of pain. He remained under care for nearly a year, the congestion very gradually disappearing (except a varicose state of a few large emerging veins), and giving place to a thinning of the corresponding part of the sclerotic. Thus, in the ciliary region of each eye, there was a ring (incomplete above), or narrow belt of sclerotic which had become thinned and allowed the black choroid to show through it; this change was more marked in the right eye, which had throughout suffered more than the left. The thinning was not accompanied by any appreciable bulging of sclerotic. The thinning did not extend

quite up to the corneal edge, but a narrow ring of normal white sclerotic intervened between the cornea and the diseased part.

This man had severe rheumatism, probably from his account rheumatic fever, several years before the inflammation of his eyes, and while in India. He also, in the same country, had many attacks of ague. He stated that he had been liable to attacks of rheumatism in a slighter degree since his rheumatic fever. He had black hair, dark, rather sallow complexion, and light grey irides.

He was not aware of any arthritic history in any of his relations.

Case LXXXVI.—*Iritis in one eye in an old woman—History of severe rheumatism, and presence of chronic arthritis in the patient—Patient subject to bad sick headaches, and has had jaundice—Family history of rheumatism.*

Mrs. C., æt. 67, has had one attack of iritis in her right eye. I treated her for it in January, 1871; the iris was adherent in many spots to the lens-capsule; there was no corneal change whatever.

She has brown hair, blue eyes, and a rather sallow complexion. She states that many years ago she was laid up for a month with what she calls rheumatic fever; it affected various joints, but especially the knees. Since then she has never been laid up by rheumatism, but has often had pains in her knees, especially in spring and autumn. Both knees have been equally bad. She now has great thickening of synovial membrane in both knees, and abundance of pedunculated bodies can be felt in the joints. The condyles cannot be distinctly felt for lips on account of the synovial thickening, but both patellæ are irregular on their front surfaces and borders, from bony outgrowth. The left knee grates very decidedly on movement. This patient has been liable since about the age of 24 to sick headaches; they were formerly much more severe than they are now. She has often noticed that her sight became dim for a time during the headaches, and of late years has sometimes had numbness in her hands and feet. Several years ago she had jaundice.

Only one relative, so far as she knows, has ever had any arthritic disease. This was her mother's brother; he was very

rheumatic, and was confined to bed for eight years by rheumatism.

CASE LXXXVII.—*Iritis in a woman who is subject to severe neuralgia of the 5th nerve, and has rheumatic arthritis—Family history of "rheumatic gout."*

Mrs. B., æt. 32, came under my care in January on account of iritis in her right eye of about six weeks' duration. There were also peripheral opacities in each lens, but no signs of iritis in the left eye. She told me that for many years she had been liable to attacks of neuralgia in the face, lasting generally only a few days. She said, however, that she had had an attack of this pain of unusual length before the eye inflamed; it had been on the right side of her face, and she referred it to the roots of the upper teeth; it lasted for eight weeks on and off. The face got quite well for a week or so before the eye inflamed. When, however, the iritis began, she again had most severe neuralgia of the forehead and back of head on the right side; she was laid up a fortnight with the pain in the head and eye.

About five years ago she was laid up for a week with rheumatism in her hips, but has had no other inflammation of her joints. There are, however, small lips on the inner condyles of her femurs, and her right knee cracks freely when she moves it.

She states that her mother's father had "rheumatic gout;" her mother, who died at the age of 53, is believed not to have been arthritic.

(To be continued.)

CASES ILLUSTRATING THE OPHTHALMOSCOPIC APPEARANCES OF SYPHILITIC CHOROIDITIS.

By Jonathan Hutchinson, F.R.C.S.

In the accompanying ophthalmoscopic plate three illustrations are given of the different forms and stages of disseminate or patchy choroiditis in connexion with syphilis. In two the taint had been acquired by the individual, in the third it was inherited. As I purpose shortly to give some general remarks of the forms of choroidal disease which occur in syphilis, the stage of malady at which they are met with, and the best means of differential diagnosis, I shall for the present content myself with simply recording the notes of the cases to which the portraits belong.

Case I.—*Syphilitic retinitis with Keratitis punctata seven months after primary symptoms—Perfect recovery under treatment—Choroiditis disseminata four years later—Extravasated blood at yellow spot.* Portrait of fundus (Fig. 1, plate iv, vol. vi).

Mrs. Middleton, then aged 27, was admitted at Moorfields in February, 1845. She had suffered from syphilis in June of the previous year. At that time she had sores in the genitals, sore throat, and a copious rash. These symptoms had wholly disappeared when she applied to me for her eye, and the only other indications of syphilis then present were hoarseness and loss of hair. Her right eye ailed nothing. On the posterior lamina of the left cornea were three or four little white dots of deposit. The vitreous was clear, but the retina was generally hazy, and the margins of the disc were wholly concealed. There were no extravasations. From her account it appeared that the eye had been inflamed for two months or more.

The prescription consisted of six grains of iodide of potassium and two drachms of the solution of bichloride of mercury three times a day. It was continued steadily from February 28 to May 4. At the latter date she could read brilliant with the

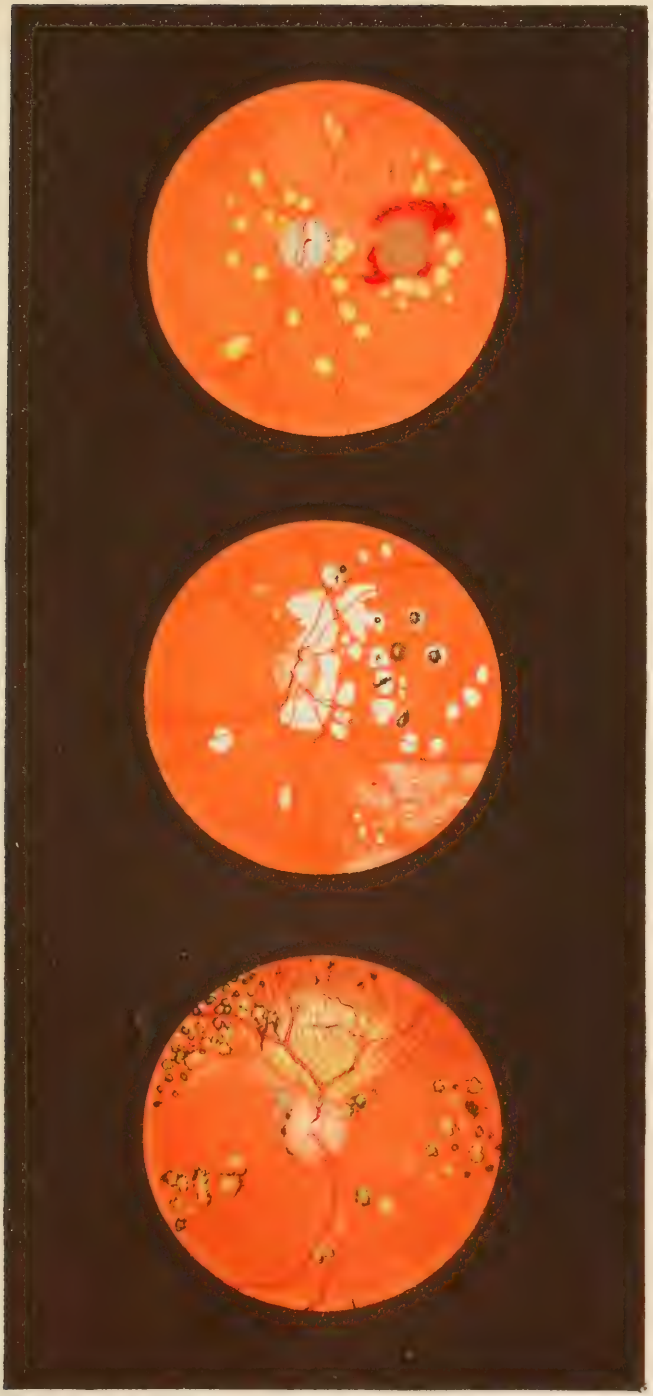


Fig. 1.

Fig. 2

Fig. 3.

F. Burgess del. adnat. et chlith. W. West imp.

SYPHILITIC CHOROIDITIS.

affected eye, having at the beginning been able to read only No. 12. The corneal deposits had wholly disappeared, and, excepting a slight indistinctness at the margin of the optic disc, the retina had wholly cleared. The other eye continued quite well. The patient had been made the subject of a public demonstration during the early stage. I find added to my notes at the date of her discharge, "If I had examined the eye without kowing the previous history, I think I should have considered it quite normal."

In January, 1869, exactly four years after her first attendance and nearly five from the first syphilis, Mrs. Middleton again applied. It was now the right eye which was affected, the other had continued quite well. She had taken no medicine since her former attendance and had enjoyed good health. Her right eye had been failing for about six months; she had during this time been much troubled with "blacks flying before it," and had also experienced some pricking pain in it. With the right she could but just count fingers, and only when held to the temporal side. Looking forwards she could not tell black from white. With the left she read [illegible] but not easily. There were no iritic adhesions. On the examination with the ophthalmoscope (January 11, 1869) we found the right choroid spotted over with small white or yellowish-white patches. These patches varied somewhat in size, looking, most of them, about as large as shot corns, but some much less. With but very few exceptions, none of them showed any pigment either at edges or on the surface. The retina was at most parts quite clear. The yellow spot was of a dull grey-brown from the remains of a blood-clot; above and below it some traces of recent blood remained. The appearances are well shown in a drawing which Mr. Burgess made for me. The retinal vessels were of normal size, the disc a little pale, but not much so.

March 6. There has been a little improvement under treatment. She can now see the bars of the window and distinguish colours. She still cannot see $\frac{20}{200}$ nor count fingers. The blood has been absorbed, but at the yellow spot an ill-defined grey patch marks a local separation of the retina (?). The choroidal patches have somewhat increased in number, and have scarcely changed in character. Scarcely any of them show any trace whatever of increase of pigment, and where it does occur it is in

the minutest dots. The other eye is perfect, and no choroidal patches can be found.

This case is of value—

1st. Because we have the full history of the patient's attack of syphilis.

2nd. Because it well illustrates the relationship between retinitis and choroiditis: the one a secondary symptom, the other occurring in the tertiary stage.

3rd. On account of the interval of absolute latency as regards syphilitic symptoms. Had the patient come under the care of a surgeon to whom she was not known, and had she denied syphilis, there would have been nothing whatever by which to establish the diagnosis. She had no other symptoms, and looked florid and well.

4th. We have an illustration of the fact that tertiary syphilitic lesions are often or usually unsymmetrical.

5th. It is of interest to note the almost entire absence of pigment disturbance.

Case II.—*Choroiditis disseminata in a late stage and in connexion with Constitutional Syphilis.*—(Portrait, Fig. 2, plate IV.)

I have unfortunately for the present mislaid my notes of this case. I can only state from memory that the portrait shows the fundus of a patient who had many years ago suffered from acquired syphilis, and in whom the results of choroiditis were seen in the stage of atrophy. All traces of lymph had been removed and abrupt white patches remained, the whiteness being due to the exposure of sclerotic. Many of the patches showed pigment accumulations, but in many there was none whatever. The patches near to the disc and about the yellow spot were most of them of considerable size, but towards the periphery were large groups of exceedingly small ones.

Case III.—*Heredito-syphilitic Choroiditis disseminata—Characteristic physiognomy and teeth—History of remarkable infantile mortality.*—(Portrait of fundus, Fig. 3, plate iv, vol. vii.)

30th September, 1869.—Emma Gamm, æt. 17. Her physiognomy and teeth were most characteristic. She was the oldest

living, five born before her having all died (three still-born). Six since had been born alive, and of these only one was now living.

The only other living child was a boy, now aged 7, who had never suffered from his eyes, and who had enjoyed good health. None of those dead lived to be older than seven months.

With her left eye she could but see shadows, with her right she read $\frac{2}{200}$. There was a strong divergent squint, which was stated to have been present from childhood. Her right first inflamed at the age of seven (probably interstitial keratitis).

When an infant, Emma G. suffered much from a sore mouth and from snuffles.

A sketch was taken of her left eye as a good example of choroiditis disseminata from syphilis. The fundus was speckled over with patches of absorption with pigment deposit. These were placed very irregularly. One was seen just below the optic disc. Some of the patches were round, sharply defined, without pigmentation. The patches were very abundant at the extreme periphery, then occurred a belt of choroid, which was almost free, and next, near the centre, were numerous, irregularly-placed patches, as seen in the sketch.

In the right eye the patches were much fewer in number.

There were a few very slight iritic adhesions in the right eye.

Note.—In a few cases of myopia patches, almost precisely similar to those seen in such cases as the present one, are met with But the patches are arranged differently in the two cases. In myopia they are almost always seen chiefly at the position of the yellow spot, whereas in syphilitic cases they occur irregularly, and are almost always abundant at the extreme periphery.

CASES SELECTED FROM HOSPITAL PRACTICE.

Case I.—*Wound of eyeball, with fracture of orbit, ending fatally.*

Under the care of Mr. Hutchinson.

The following case was, whilst the patient was in our wards, one of great interest and obscurity, nor was the latter element wholly removed by the autopsy. At first we had no suspicion that the lesion was more than panophthalmitis after wound of the eyeball by a chip of metal. It was thought not unnaturally that the man's general symptoms, sleeplessness, &c., were in part due to the moral shock caused by the accidental loss of the only eye he had left. When it became evident that they meant more than this, the suspicion was aroused that the foreign body might have been driven through the eyeball and also through the walls of the orbit. A search disclosed the fact that the orbital wall was indeed fissured, but did not lead to the discovery of the cause of the damage.

Synopsis.—*Wound of eyeball and fracture of inner wall of orbit into ethmoidal cells by a chip of iron—Excision of eye on second day—Suppuration of orbit for three days after excision—Intense pain in head and back with high temperature, beginning on 6th day after the accident—Exploratory operation—Death on 18th day—Abundant recent lymph in subarachnoid spaces—Abscess between orbital periosteum and roof of orbit, with discoloration of the latter—Foreign body not found—No well-marked paralysis.*

(Notes by Mr. Nettleship.)

William N., æt. 33, a worker at an iron factory, was holding a piece of cold iron which another man was hammering, when a chip of iron broke off and struck his left eye. Sight was immediately lost, and severe pain set in very soon after the accident. His other eye had been lost and excised eight years before by Mr. Hutchinson after a similar accident. In the present instance

he was taken first to the Westminster Hospital and placed under the care of Mr. Francis Mason, by whom he was transferred, at his own request, to Mr. Hutchinson, at the Ophthalmic Hospital. The chip of iron was believed to be still in the eye at the time of his admission under Mr. Hutchinson's care, 48 hours after the accident. He was then very ill, partly from the severe continuous pain and partly from the state of extreme mental depression into which he had been thrown by the occurrence of sudden, total, and permanent blindness. The lids of the left eye were much swollen, and there was a small recent vertical wound on the edge of the lower lid near the outer canthus. The eye was quite lost, and there was a large wound at the lower and outer part of the globe involving the outer part of the cornea and the ciliary region of the sclerotic. The greater part of the contents of the globe had already escaped. On dissection of the eye after excision, a layer of recent lymph was found on the choroid; the choroid and sclerotic were œdematous and infiltrated with yellowish purulent-looking matter, and a thick layer of the same puro-lymph lay between the two coats. The lips of the wound in the sclerotic were thickened and rounded. There was no wound other than the one mentioned above. During the next three days the cellular tissue of the orbit swelled considerably and suppurated freely, and he had some pain in the part, but on the 4th day after the excision the orbit looked quite healthy and the pain had quite left him. During this day, however, the *4th after the operation and 6th from the accident*, he began to complain of intense pain just behind his left ear. When questioned as to a rigor, he said he had felt cold and shivering, but not enough to make his teeth chatter. In the evening his T. was 102·4. The next day (*7th from the accident*) the pain continuing, he was freely leeched at the left of the occiput, with some relief to the pain. In the morning, T. 103·2, evening, 104·.

On the *8th day*, in the morning, T. 102·6, evening, 103·1.

9th day, morning, T. 102·, evening, 103·5. The pain during these two days remained much the same as before, and the subsequent attacks from which he suffered were of the same kind. He described his head as constantly aching moderately, but this moderate pain was bearable and comparatively trivial. Every two or three hours, however, he had a paroxysm of intense agony, during which he trembled all over, screamed out, and

at times became almost unmanageable; indeed, towards the end, he became quite delirious during these exacerbations. He said he felt as if during these attacks his skull would split or come off, or as if a horse were constantly kicking him on the head.

10*th day*, T. morning, 102· During the night of the 10th day he had a very severe attack of pain in the lower part of his back,—a "craunching pain;" he asserted that during this pain his left leg was drawn up for a short time so that he could not straighten it. The pain in the back continued at intervals after this date; it seemed generally to precede a paroxysm of headache. To-day he began taking 10-grain doses of bromide of potassium every second hour.

11*th day*, it was noticed that there was no paralysis, there had been no sickness, his bowels were fairly open, and he was taking some food, though not much. Tongue moist, but rather furred. His wife asserts that just before the severe attacks of pain in the head his neck and face turn very red, remain so during the attack, and become pale again when the headache abates. In the morning, T. 102·6, P. 82, R. 22; evening, T. 101·8, P. 80.

12*th day*. Early in the morning a hypodermic injection of morphia was given to relieve the horrible pain; he slept well after the injection for about six hours, when the pain returned. Mr. Hutchinson then explored the orbit, and found a fracture of its inner wall involving the ethmoid bone and opening into the ethmoidal cells; some thin fragments of loose bone were removed, but no foreign body could be found. Air bubbled up through the fracture when he coughed and his nostrils were stopped. Some weakness of the facial muscles on the right side was noticed while he was under the influence of chloroform. The pain returned with increased severity after the operation, and he became occasionally delirious; between times he was extremely despondent. In the morning (before the operation), T. 103·4, P. 120; evening, T. 103·8, P. 120. After the exploratory operation he was ordered to take 1 grain each of calomel and opium every four hours.

13*th day*, morning, T. 101·8, P. 98; evening, T. 101·8, P. 96.

14*th day*, morning, T. 100·4, P. 86; evening, T. 101·9, P. 72. During these two days he had much less pain, being partly under the influence of opium; morphia, however, was injected twice.

There was a little spasm of the vesical sphincter, probably from the opium. It was noticed that for about an hour before the paroxysms of pain, and during their continuance, his feet became very cold. There were still no signs of paralysis, except the somewhat doubtful weakness of the right facial. The pills were discontinued after the evening of the 12th day on account of free purgation. He was not salivated.

15*th day*, morphia again required. In the evening he was semi-comatose, and began to pass his urine and fæces unconsciously. He frequently moved the left leg, but it was noticed that he generally kept the right lying flat on the bed. In the morning, T. 103, P. 90; evening, T. 101·1, P. 80.

16*th day*, partly conscious, seemed to understand what was said to him, but could not articulate words clearly. Only occasionally complained slightly of his head. Diarrhœa continued. Paralysis of sphincters as before. Reflex action of right leg decidedly feebler than that of left. In the morning, T. 103, P. 80; evening, T. 104·4, P. 96.

He died in the morning of the 18th day after the accident. There had been no new symptoms of any importance.

The reader's attention may be asked to the following points in the above rather lengthy narrative:—1st, that the man suffered most intense pain in his head, and that it began on the injured side; 2nd, that there was no definite paralysis of any muscle or limb; 3rd, that throughout there was but very slight acceleration of pulse.

Examined five hours after death. Only the head was inspected. There was abundant recent lymph in the subarachnoid space at the base of the brain, and extending thence along each sylvian fissure to the upper surface of the anterior lobes, where it ceased to form a continuous layer, and occurred only in a few scattered patches between the convolutions, chiefly on the left side. Many of the nerves at the base of the brain were cased in lymph, notably the seventh pair, which were covered with inflammatory material quite up to the internal meatus. The layer of lymph became much thinner over the pons and medulla, and seemed likely to disappear entirely in the upper and middle part of the cervical region. There was no trace of lymph in the arachnoid space anywhere. There was a distinct layer of lymph on the choroid plexus in the descending horn of the right ven-

tricle, and the corresponding part on the left side was discoloured as if from infiltration, but there was no layer of new material upon it visible to the naked eye. The brain substance everywhere appeared quite healthy. There was nothing amiss with any part of the dura mater so far as could be ascertained by naked-eye examination. The bone forming the roof of the left orbit, over a patch as large as a three-penny piece, just to the left of the cribriform plate, was discoloured and dark. Between this discoloured patch of bone and the orbital periosteum beneath it there was a small circumscribed collection of pus. The rest of the roof of the orbit looked healthy, and it is well to repeat that the dura mater covering the discoloured portion of bone was neither thickened nor altered in colour. The optic nerve of the left side and its sheath were carefully examined, but no trace of pus visible to the unaided eye could be seen between the nerve and its sheath in any part, and the nerve itself appeared normal. There was no pus or lymph in the sphenoidal fissure or cavernous sinus. In the sphenoidal sinus there were a few drops of opalescent yellowish fluid, looking as if it contained a little pus, but there was no thickening, redness, or other discolouration of the mucous membrane of the sinus. This sinus, as well as the ethmoidal cells, nasal cavity, and orbit were carefully searched, but no foreign body could be found.

CASE II.—*Case of Paralysis of the fifth nerve in a boy. No diagnosis as to cause.*

(Under the care of Mr. STREATFIELD; notes by Mr. HUGGINS.)

Charles Orwell, æt. 13. Patient has never been ill until about seven weeks ago, when he had what his mother describes as low fever; he was ill a little over five weeks, but was only confined to bed four days. He has now been convalescent about ten days. There is no history or appearance of congenital syphilis. He is a good-looking, well-grown lad, is rather pale, and gives one the idea that he has been ill; says that about a week ago he noticed the left eye bloodshot, but neither irritable nor painful. He went to a doctor, who ordered him poppy lotion, and applied a blister to the left temple. He afterwards went to a chemist's, and got some lotion to drop into the eye.

Three days ago, the sight of the left eye began to fail without pain or any photophobia.

At present there is a large opacity (of an oval form, having a greyish-white shining surface, and being very dense), occupying the centre of the cornea, but having the pupil clear at its upper margin. (The opacity is thought to be due to lead.) There is pus in the anterior chamber and on the surface of the iris, the pupil is of moderate size, circular, and fixed; the conjunctiva red and swollen, with some muco-purulent discharge. There is no intolerance of light.

Sensation is entirely lost on the surface of the cornea and conjunctiva, also on the left side of the face, the anæsthesia extending vertically from the chin and ramus of the jaw to the top of the head, laterally from the median line to the ear, with the exception of a space bounded in front by a line drawn in a curved direction from the external auditory meatus to about the point where the facial artery crosses the ramus of the jaw. Sensation is perfect on the surface behind and below this line, and is continuous with that in the neck. Above the ear the anæsthesia is limited laterally by the temporal ridge. There is complete anæsthesia of the left half of the tongue, the loss of sensation extending to within an inch of its base; also of the inside of the cheek, the gums, and roof of the mouth, as far back as the anterior arch of the fauces and middle of the soft palate, internally as far as the median line; there is loss of the sense of taste in that part of the tongue corresponding to the loss of sensation.

There is complete anæsthesia of the left cavities of the nose, and the sense of smell is also much impaired; there is superficial ulceration about the left corner of the mouth and left nostril, also some swelling of the left side of the nose. There is a bald patch on the top of the head on the left of the median line, looking like a cicatrix with some superficial ulceration at its edges (the hair near it is not affected by fungus). The muscles of mastication act as well on the left side as on the right, and the muscles of expression are unaffected. There is perception of shadows in left eye. The sight of the right eye is perfect.

Treatment.—Eye to be bound up with fotus belladonna; to take mixt. ferri perchlor.

Nov. 15.—The opacity on surface of cornea has nearly cleared away, evidently from superficial sloughing; there is a large abscess

in the cornea beneath and another in the iris; there is still good perception of shadows. Eye to be bound up as before. To take syrupi ferri iodide ʒj., ol. morrhuæ, ʒij.; bis die. A bottle containing some lotion was brought, which was found to contain lead.

Nov. 20.—Cornea converted into a mixture of pus and slough. Iris cannot be distinguished; conjunctiva more swollen and bluish-red. No perception of light, sensation returning in side of tongue. Excision of eyeball proposed; patient has not attended since.

Case III.—*Blow on one eye, followed a fortnight later by sudden pain in the right forehead and proptosis—Subsequent paralysis of all the muscles of the right eyeball—Afterwards extreme proptosis of the other, with acute neuritis—Recovery.*

(Case under the care of Mr. Hutchinson.)

The following case is worth relating, if only on account of its extreme obscurity. It seems almost impossible to give any plausible conjecture as to the cause of the disease.

Henry Rowney, æt. 16, a very intelligent lad, was admitted on March 8, 1862, as an out-patient at Moorfields. He had paralysis of all the muscles of the right eye, and the pupil was widely dilated. The eye was quite fixed in the orbit. He could see only $\frac{20}{200}$. With the ophthalmoscope nothing was discovered. He had already been to Guy's Hospital (under Mr. Bader's care), and possibly atropine had been used. His symptoms had commenced one month before, and the following was his statement respecting them:—He went to work quite well one morning. About 4 o'clock in the afternoon, he had an attack of violent pain in the right forehead. He took his tea, but threw it up again. He went home in the evening, was very giddy, had most severe headache and continued sickness. His mother "led him to a doctor's" the same evening. He now had drooping of the right eyelid. Through the night he continued sick, and next morning, according to his mother's statement, his eyeball "projected almost out of his head." A fortnight before this occurrence

he had been struck a hard blow over the right eye with the back of a boy's hand. It gave him much pain, and he could not take his supper that night. At the time of his admission, the eye had receded into the orbit, but he still had severe headaches every night and morning. He still went to work every day, his employment being that of a wood polisher. He slept well. The pain in the head was near the frontal eminence of the right side, and did not pass higher. His right ear "had a kettle boiling in it," and was very deaf. He could only hear a watch closely pressed over it; while on the left side he could hear well. Sensation was defective but not absent in the eye, upper lid, forehead, and side of nose.

It was noted, March 25th, that he could only spell No. 16 (J.) with the right with the aid of + 12. Without the glass, he could only spell 19 (J.). The disc and retinal circulation seemed quite normal. There was no trace of lymph, nor any degree of pallor to be detected. On April 1st, congestion of the conjunctiva and œdema of the left eye had appeared. On April 5th, it is noted "the paralysis of the right eye persists. The left eyeball is becoming prominent and more congested. The conjunctiva is œdematous and shows many large tortuous veins. There is some aching pain over the left brow. The pain has left the right side and gone over to the left. The left pupil is active, and the vision perfect. There is no paralysis. The central veins of the left are full and dark, but not to an extreme degree; the veins of the right are normal. The evidence of venous distension is shown in all parts of the conjunctiva of the left, ocular and palpebral. There are, however, no large veins visible passing over the edges of the orbit. The veins of the right are not distended, and the lower lids of the two contrast strongly when exerted. The left shows a distinct network of veins, very much enlarged, but the different trunks are easily distinguished."

On April 12th he was admitted into the London Hospital. He could then spell No. 2 (Sn.) at 8″, but with difficulty. A fortnight later, the proptosis was extreme. There was no loss of sensation. The pupil was of normal size, and acted a little. He complained of sickness in the morning, and on three occasions vomited his breakfast. He could then only count fingers with the left. With the right and a diaphragm $\frac{20}{40}$ with + 10 he read No. 3 (Sn.) at 10″.

On April 30th, neuritis of the left optic disc, with numerous extravasations of blood, was detected. He could then sleep well. On May 12th, he had less pain and less prominence of the left eyeball. The right eyeball moved a little in all directions. A week later, the improvement was more marked. On May 26th, the left eyeball was noted to be quite moveable in the swelling behind it. He had no perception of light, the pupil being of medium size and motionless. On July 21st he could count fingers. On August 4th he was very deaf, most so on the right side, and complained much of a buzzing noise,—"all of a buzz." He could not hear well on the left side, but had no "buzzing." He then became an out-patient under the care of Mr. Tay.

On August 18th it was noted that the external rectus was paralysed on both sides, causing convergent strabismus. The internal rectus seemed active on both sides; the superior and inferior weak on the right side. He had no pain, and was at work again. He still had the noise in the right ear.

October 27th.—It was noted that with the right eye he could see $\frac{2}{40}$, and with + 12 No. 2 (Sn.); without a glass he could read 52 (Sn.).

November 3rd.—The noise in the right ear was reported to be greater.

January 5th, 1870.—It is noted he still continued at work as a wood polisher, and no change had occurred in his symptoms. He continued to attend till August 10th, when he ceased to do so. In May it was noted that the noise in the ear was said to be louder.

CASE IV.—*Suppurative Meningitis under the tentorium cerebelli following on Iridectomy on account of pain and increase of tension of the eyeball—Hæmorrhage within the eyeball—Suppuration of the eyeball—Abscess external to the eyeball—Death—Inflammation of the pia-mater covering the cerebellum, &c.—Granular kidneys, and general degeneration of viscera.*

By WAREN TAY, F.R.C.S.

THE interest of the following case lies in the very serious changes which resulted from the performance of a very simple operation in a patient who was advanced in life, and whose tissues were in a state of general disorganisa-

tion. It is probable that after the performance of the iridectomy the eyeball became filled with blood clot, which degenerated and was followed by suppuration. An abscess formed at the back of the orbit, and most probably, as suggested by Dr. Sutton at the autopsy, gave rise to slight meningitis at the base of the brain, and this again to the severe suppurative meningitis found beneath the tentorium cerebelli. Why the inflammatory changes should have been so well marked on the left side of the cerebellum and so slightly marked at the base of the cerebrum and around the optic formen is at present unexplained. The question of removing the left eyeball while the tissues around were infiltrated, and it was still painful, was discussed, but it was not formally proposed to the patient, when she expressed unwillingness to have anything further done.

Margaret Edgley, æt. 68, was admitted into the London Hospital under my care, May 15th, 1871. The cornea of the left eye was "blistered," the ciliary region was dusky and the iris bulged forwards. There was some increase of tension, and the eye seemed in a condition simulating chronic glaucoma. She had had pain of a severe, but not extreme character at intervals for some months. The pupil was triangular in shape, its base being downwards and outwards. Behind the right pupil was a membrane with several openings, through which the fundus could be seen. There were evidences of considerable atrophy of the choroid. She said that she had been under the care of Mr. Bader, two years before, for cataract, and that he had operated on both eyes. "She had the cataracts at home." The vision in each eye amounted to little more than perception of large objects. She could not see her way about, as the left eye was painful and the globe appeared somewhat hard. Mr. Hutchinson, who kindly saw the case in consultation, recommended that iridectomy should be performed on the left eye in the hope of relieving the pain and possibly of restoring a certain amount of sight, and that the membrane across the right pupil should be torn with needles. A week after admission these suggestions were carried out. No special difficulty of any sort was encountered in the course of the operation

on either eye. The iris of the left eye was easily torn ("rotten"), but enough was removed to make a fair-sized pupil, and the blood which was effused was all removed with a curette without difficulty. In the evening, some pain was complained of in the eye, but a leech being applied to the temple it passed away. The next day the left cornea was quite bright, but there was a little blood on the iris. The eye was said to be free from pain, and the right eye was quite quiet. About nine o'clock in the evening severe pain came on in the left eye. A leech was applied to the temple, and the pain was relieved for a time, but returned in the course of the night and continued. The next day the eyeball was very painful, the cornea was quite clear, but there was more blood in front of the iris, and the eyelids were much swollen. The following day the eyelids were more swollen; she had had great pain in the course of the night, but this had moderated in the course of the morning. During the next few days the pain in the eyeball had almost passed away, and the swelling of the eyelids had somewhat diminished. There was no fluctuation to be detected in the orbit. The cornea had given way, and there was a considerable amount of purulent discharge. A poultice was applied, and tonics and stimulants were given internally. She was very feeble, and had a troublesome cough, spitting up a quantity of phlegm. On the 29th, a week after the operation, she was very feverish and sweated a great deal. She had not shivered. During the next few days she seemed to improve. On June 2nd she was reported by the nurse to take her food well and to be quite cheerful. She complained of no pain, and seemed better. On June 3rd she was seen by Mr. Nettleship at 2·35 p.m. He noted her temperature to be 106°, her pulse 148, and the respirations 75 per minute. At half-past seven that morning she had had a "shivering fit," rather a bad one, but lasting only a few minutes. Since that time she had remained very ill; when seen she was semi-conscious, there was slight "subsultus," and she did not put out her tongue when asked. Her skin was moist and her face was dusky. She died the same night. The right eye had remained quite quiet.

At the *post-mortem* examination conducted by Dr. Sutton, the most important changes were found within the head, but nearly all the viscera were found more or less diseased. The kidneys were very granular, the liver was soft and fatty, the heart was

large, soft and of a pale dirty colour. The tricuspid orifice was enlarged. The lungs were congested. On removing the calvaria, &c., the arachnoid and pia-mater covering the upper and lateral parts of the hemispheres were quite healthy, and the base of the brain and the neighbourhood of the optic foramina appeared at first healthy. On incising the tentorium cerebelli, some purulent fluid at once escaped, and a quantity of pus was found in and under the pia-mater covering the under surface of the cerebellum, and it passed round to the upper surface where there was a considerable quantity of yellow pus beneath the pia-mater. Both sides of the cerebellum were covered with pus, but the larger quantity was on the left side. The third and lateral ventricles contained some blood-stained puriform fluid. The lining membrane of the ventricles was much congested, and there were many spots of extravasated blood in the membrane, and the largest number were seen in the lining membrane of the left lateral ventricle. On close inspection by Dr. Sutton and Mr. McCarthy, a little pus was noticed around the basilar artery and beneath the pia-mater covering the pons varolii, and there was rather more puro-lymph passing over the right fissure of sylvius at the base of the brain. There was no pus around the optic nerves where they issued from the orbit. Mr. Nettleship, however, kindly removed the roof of the orbit on the left side, and at first no pus was found, but, on opening the sheath of the optic nerve immediately within the orbit, a minute quantity was seen, and on tracing it backwards the amount within the sheath increased. While exposing the eyeball, a quantity of dirty-red, apparently blood-stained, pus escaped. This collection was outside the eyeball, but there was no distinct abscess-wall. There was a blood-clot within the eyeball. The tissues in the right orbit were quite natural.

CASE V.—*Wound of Eyeball in sclero-corneal region—Sympathetic Ophthalmia of the other Eye in five weeks—Enucleation of the injured Eyeball—Temporary improvement, followed by almost complete loss of sight in the Eye sympathetically affected.*

By WAREN TAY, F.R.C.S.

A young man, æt. 23, was admitted into the London Hospital during the first week of August, 1872, under my care. Whilst

at work his right eye had been struck by a piece of metal, which he stated was not of large size, but he did not think it had remained in the eye. A gaping wound was found in the sclero-corneal region, and the globe was collapsed, a quantity of vitreous and it was suspected the lens also, having escaped. He said he had no pain in the eye, and refused to have any operation performed, though it was represented to him that the eye would be of no use to him and might injure the other. In the course of a few days the eyeball filled out again without any untoward symptoms, and he could see the shadows of fingers passing in front of his eye. Cold applications had been used to the eye and atropine solution. He had had no pain. It was evident that his lens was still in place by means of the catoptric test. His sight did not improve further. He was carefully watched for a month, and then at his request was allowed to go home. He was distinctly told that he was liable to have the other eye become affected at any time, and that should this occur he should apply at once. In nine days' time he came into the ward to see the nurse, who had been kind to him, and mentioned to her that the good eye was becoming dim. She urged him very strongly to see me at once, but he was afraid to do so, and did not come till four days later, that is, a fortnight from the time that he left the hospital, and about four or five days from the commencement of the attack of sympathetic irritation. He assured me that he had no pain in the injured eye, and that he had not had any. The eye seemed quite quiet. The left eye showed decided symptoms of commencing iritis. The pupil was small and would not act; the iris was discoloured and the aqueous looked muddy. His vision was limited to the largest letters at a distance, and he could only read moderate-sized print. A solution of atropine was applied at once, and he was advised to have the injured eyeball removed. He obstinately refused at first, but after some persuasion yielded, and the operation was accordingly performed. No foreign body was detected in the orbit, and, on opening the eyeball, no trace of any recent inflammation or of any foreign body could be found within it. The eyeball was not preserved, nor was any microscopic examination made. It seemed so free from recent mischief, to the naked eye, that I overlooked the desirability of any further examination. In the first week afterwards the condition of the remaining eye

improved somewhat. The pupil dilated, leaving a ring on the anterior surface of the capsule of the lens, indicating where it had been adherent for a short time. His sight, he said, was much clearer, but, on testing, the improvement was not very marked. This improvement was but temporary: the anterior chamber became gradually deeper, and punctate deposits could be seen on the posterior lamina of the cornea, the iris sloping backwards from its ciliary margin to the pupillary edge where it was adherent to the capsule of the lens. The whole iris seemed pulled backwards, and the anterior surface of the ciliary attachment showed a ring of small protuberances either due to effusion behind it or to nodules of lymph in front. They seemed too uniform for lymph. The size of the pupil was, of course, much larger than before the use of atropine. The capsule of the lens and the lens itself became studded with a number of white dots, indicating some change going on in their structure from chronic inflammation. The fundus could not be illuminated for ophthalmoscopic examination, but with focal illumination, an indistinct mass of substance could be seen, as if either the retina were being pushed forwards or the vitreous was becoming altered. No floating bodies could be detected. His sight gradually failed, so that at the end of three months from the time of the accident his vision was limited to the perception of shadows. The anterior chamber afterwards became shallower, losing the appearance of a short funnel. He could not see his way about.

The points of interest, in the above case, seem to me, chiefly, that, in the first place, the eyeball filled out again, and it became evident that the lens had not been injured, though vitreous must have escaped; that he should gain any sight in an eye so damaged, and that the eye should remain (apparently) perfectly quiet for a month or five weeks without exciting any irritation in the other eye, and that he should then, so quickly after dismissal, have a sympathetic affection come on without the injured eye becoming inflamed or painful. The inflammation of the uninjured eye seems to have involved all its internal structures, and with the exception of a temporary check, has proceeded fairly rapidly to the almost total destruction

of vision. The condition of the lens and its capsule was one which is certainly not often seen. There was comparatively little ciliary or conjunctival congestion and an absence of pain throughout. The pupil was not occluded. The treatment consisted in the employment of atropine and the internal administration of small doses of grey and Dover's powder with quinine. Counter-irritation was applied from time to time. It is greatly to be regretted that the patient did not consent to have the eyeball removed when first advised to do so, and that he did not apply for advice as soon as ever the uninjured eye became affected. The question of the advisability of removing wounded eyeballs is generally acknowledged to be one of great anxiety in certain cases. So many eyes which have received severe injuries in the ciliary region remain quiescent, and set up no irritation, that it cannot be laid down as a rule that all eyeballs in which we do not expect useful sight to be regained should be at once removed; yet I fancy it would often be better to remove, than to try to save, in such cases. In many instances we get timely warning from a complaint of pain or from visible irritation, that it will be well to remove a damaged eyeball; but in such instances as the one above narrated, if the globe is not taken out at the time of first seeing the patient, there is no second chance afforded before it is too late. If there is any probability that a foreign body remains in the eye, the indication is clear. A possibility existed in this case, and I had no hesitation in advising excision, though the eye was quiet. There was no useful sight remaining. Cases have been recorded in which the injured eye ultimately proved useful, whilst the sight of the one secondarily affected was lost, but such a result could not have happened here. Enucleation seems to be of use only in the earliest stage of irritation. If marked sympathetic iritis be once set up there is probably not much good to be gained, a temporary check only will occur in the progress of the disease.

OBSERVATIONS ON DEFECTS OF SIGHT IN DISEASES OF THE NERVOUS SYSTEM.

By J. Hughlings Jackson, M.D., F.R.C.P.,

Physician to the London Hospital, Physician to the Hospital for the Epileptic and Paralysed.

I give here a short account of some of the facts and opinions I have published within the last year or two on matters of common interest to physicians and ophthalmologists.

(1.) Epileptiform Amaurosis.

In this Journal, vol. VI, part 2, 1868, I speak of cases of what I have called Epileptiform Amaurosis, and which I used to call Epilepsy of the Retina. I now make further remarks thereon. Being a physician, I have studied such cases simply as members of a *class* of temporary nervous affections and not as symptoms of disease of the eye. There are also temporary affections of smell (subjective sensations of smell). The affinities of both these temporary sensations are to epilepsy. The patient, who is subject to temporary affection of sight, sometimes has it alone; at other times it is followed by a convulsion or by loss of consciousness. Similarly the patient who has a subjective sensation of smell, sometimes has it alone, whilst at other times he loses his consciousness, and may become convulsed. The temporary affection of smell or of sight in association with temporary loss of consciousness or convulsion would usually be called an aura; it is, I suppose, the sign of the beginning of a central nervous discharge, and sometimes, that is when the fit is abortive, the discharge stops short just after it has begun. Epileptiform amaurosis is, in short, *part of a fit;* it is the initial stage only. We see something analogous in convulsive seizures;

there are all degrees of such seizures. A patient who has convulsive seizures beginning in the hand may sometimes have twitching of the hand only; at other times a severe fit occurs which leaves him comatose and temporarily hemiplegic.

The temporary affection of sight which I call epileptiform amaurosis* is either a simple failure of vision—a mere *loss* of sight—or it is an "over function" of the visual nervous system—development of colours, sparks, &c. The former would be analogous to temporary *loss* of power to smell, the latter to subjective sensations of smell.

Neither of the two varieties of temporary defect of vision is a localising symptom, any more than is the occasional sequela, amaurosis from double optic neuritis. In the cases I see there are, as I have implied, usually *other nervous* symptoms, such as convulsive seizures, and in some of these cases we may localise. We can localise in certain cases of *partial* convulsion. For example, if there be with either variety of temporary affection of sight (or with permanent affection of it from double optic neuritis), an epileptiform seizure beginning deliberately in the *hand*, or *cheek*, or *foot*, we may localise. We may then conclude that there is disease of convolutions of the cerebral hemisphere opposite the side of the body on which the convulsion begins, and, further, that the part of the hemisphere faulty is near to the corpus striatum.

That the association of temporary defect of vision with convulsions beginning unilaterally is not a vague or chance association, is shown by the fact that the temporary defect of sight occasionally becomes permanent; optic neuritis may develop and may leave defective sight behind it.

* Of course in *strictness*, those cases in which there is a *development* of colours, sparks, &c., are not to be called *amaurotic*. For amaurosis is a negative symptom; development of colour, &c., is a positive symptom. But as each phenomenon can occur preceding epileptic or epileptiform seizures, the use of the expression "epileptiform amaurosis" is convenient.

(2.) Optic Neuritis, with Convulsions beginning unilaterally, depends on Disease of Convolutions near to the Corpus Striatum.

I have very many times urged that the combination of symptoms* just mentioned—optic neuritis (with or without amaurosis), with convulsion beginning on one side—is the simplest one for joint work by ophthalmologists and physicians. Both symptoms must be studied. Whilst on the one hand it is of little use saying that the patient is amaurotic without describing the intra-ocular changes, so on the other hand it is of little use saying he has had a convulsion, or an epileptic or epileptiform seizure, unless we describe what *kind* of seizure it was; for a general convulsion, or a fit of an "epileptic character" will not help the ophthalmologist in the *localisation* of the cerebral disease which causes the optic neuritis. But a fit beginning in one hand, &c., will, I think, be, as I have said, very good evidence that the disease is of convolutions in the region of the middle cerebral artery, or, in other words, of convolutions near to the corpus striatum.

To say of a case that "the optic neuritis is complicated with *epilepsy*" is about as valuable as saying that "optic neuritis is complicated with *paralysis*."

The tie betwixt the two symptoms (the amaurosis, and the convulsion beginning unilaterally) is, I think, as I have suggested ("Med. Times and Gazette," April 30, 1864, and August 15, 1868), to be found in the distribution of the cerebral arteries. Similarly the tie betwixt subjective sensations of smell and temporary loss of consciousness is, I believe, that the anterior cerebral artery supplies the olfactory bulb and a vast tract of convolutions, as well as

* Strictly speaking optic neuritis is not a symptom; at any rate, it is not a symptom in the same sense as the convulsion. It is a pathological condition and is analogous, not to a convulsive seizure, but *to the changes of grey matter, on discharge of which the convulsion depends.* Again, it is not a symptom in the sense that vomiting is. It is, however, *convenient* to speak of optic neuritis as a symptom; it is the custom to do so.

part of the great commissure, the corpus callosum. Speaking very generally, symptoms are to be arranged not only according to the functional divisions of the nervous system, but sometimes according to its nutritive, at least its arterial, regions. If a patient has double optic neuritis, and also convulsions which begin in the hand or face, the disease will be found to be of convolutions in the region of the middle cerebral artery.

In the "Medical Times and Gazette," for November 23, 1872, and in succeeding numbers, I have published a series of cases of intracranial tumour, in some of which there was optic neuritis along with convulsions beginning unilaterally (face or hand). These cases will be referred to in several of the following sections by the numbers they have in that Journal.

(3.) Conservation of Sight in Optic Neuritis.

It has long been well known to ophthalmic surgeons that acute neuritis may exist when a patient can read the smallest type. But to many who are not ophthalmologists the statement seems to be simply nonsensical; it is not at all widely accepted. The first case of the series of intracranial tumour above referred to shows, however, in a very striking way, the value of the recognition of the fact (Case I, "Medical Times and Gazette," November 16, 1872). The patient was a blooming healthy-looking girl, 20 years of age. Although she had attacks of headache and vomiting, yet she was apparently so perfectly well in the intervals of these attacks that the diagnosis of intracranial tumour must have seemed *preposterous* to those who did not use the ophthalmoscope or who could not interpret its meaning.

Now this patient had a nervous symptom; that is, as above implied, she had acute double neuritis; but, as she could read the smallest type, and did not know that there was anything the matter with her sight, this nervous

symptom did not exist for those who do not use the ophthalmoscope by routine. Her sight failed before death. (Tumour and cyst of the right lobe of the cerebellum were found.)

For some time this patient had only three symptoms, the three so often found together, viz., headache, vomiting, and double optic neuritis. Now, at the most important stage of the case the third symptom (optic neuritis), as I have said, would not exist for those who do not use the ophthalmoscope *by routine*. Without it the diagnosis would have been in fault. It is true that from *very* severe headache and vomiting we may *guess* intracranial tumour, but who *would* ever guess it in a perfectly healthy-looking blooming girl, who was in good flesh, and occasionally apparently absolutely well. This indeed is the beau-ideal of a case to be mistaken early in its course for "disease of the liver." How often do we hear of amaurosis caused by "*bilious*" fever? To encourage such a mistake was the fact that the girl had always been subject to "bilious attacks." Another mistake would be hysteria. Neither of these mistakes could be made in such a case if the patient's optic discs were looked at. We did look at them, and from what we saw we were absolutely certain that there was intracranial disease, and we predicted tumour.

Conservation of sight with optic neuritis occurred in Cases III and IV of the series referred to. These were cases of convulsion beginning unilaterally. Such a convulsion, as I have remarked, points to disease of convolutions in the region of the middle cerebral artery. The next question is to ask the pathological *nature* of the disease. On this point the convulsion gives no information whatever; it points only to the *position* of certain changes in grey matter which render it explosive. The next question may be put thus. Are these local "explosive changes" produced by tumour or not? or, as it is popularly and vaguely expressed, Is the fit caused by *organic* or by *func-*

tional disease? If there be no optic neuritis the fit does not *in all probability* depend on tumour nor on any sort of adventitious product; certainly we cannot say there is tumour. But if there be also double optic neuritis we may conclude with confidence that the disease in the region of the middle cerebral artery is tumour. The optic neuritis points to the general *nature* of the disease; the seizure to the *position* of that disease. See now the bearing of routine ophthalmoscopical examination, whether sight be defective or not. It matters nothing for the diagnosis of the gross *nature* of the disease whether there is defect of sight or not; if there is double optic neuritis it suffices. In Case III there was double optic neuritis *without any defect* of sight along with convulsion beginning unilaterally. It is true I had no autopsy in this case, the patient getting well; but I have published cases of optic neuritis with convulsions beginning unilaterally, in which *post-mortem* gross disease has been found in the region of the middle cerebral artery. But what that case illustrates more especially is, that optic neuritis may not only exist with good vision, but that it may pass off, leaving sight unimpaired; on this I shall speak in Section 4.

(4.) Recovery from Optic Neuritis.

I believe it to be not uncommon for patients to recover from optic neuritis. I do not say recover from amaurosis, for I now speak only of cases of optic neuritis in which there *is no defect of sight*. Thus in Case III, "Medical Times and Gazette," Dec. 7, 1872, the patient was attending on me for convulsive seizures, when one day, May 7, 1871, he complained of his sight. I had examined his eyes at his first visit, February 9, 1871 (the discs were then normal); but I had neglected to examine them at intervening visits, April 14 and 29, thus breaking a rule I have tried to enforce. On May 7 I made this note:—
"There was nothing wrong observable about his sight,

judging from his manner, but he said he could not read for many minutes together, and that he saw badly across the road. I therefore looked at his discs, and, finding neuritis, tested his vision. When near the window he could read with each eye No. 1 of Jäger. He read slowly, and made one or two mistakes, but corrected them when they were pointed out to him. The discs were much swollen; the edges were lost. The veins were large and tortuous; there were irregular white patches and several recent hæmorrhages. How long these appearances had existed I could not tell. The discs were normal at his first visit on Feb. 9.

May 16.—He could still read No. 1 of Jäger and No. $1\frac{1}{2}$ of Snellen. He read slowly, and made four mistakes in about four lines, *e.g.*, he said "space" for "spade," which, however, he corrected himself. Still he complained of his sight. He said, "it comes over like a cloud now and then," and that when he looked at the newspapers "it comes over like a mist." His sight never failed altogether. He had occasionally "specks" in the left eye. There were no "colours." He recognised the colours in the coloured types of Snellen very well. His field of vision was normal. The left optic disc was much swollen, the veins large, and knuckling over the edge of the disc. The arteries were obscured. There were very small shapeless white patches and scattered blotches of blood. The right optic disc was in about the same condition. There were no changes at the yellow spot. There was no albuminuria. He had had a slight giddy seizure.

I gave him large doses of iodide of potassium.

The discs gradually cleared up—indeed, by June 26, the appearances would have seemed normal to a careless observer, but the edge of the disc was slightly indistinct; the arteries were traceable, and the veins were not tortuous. By direct examination streaks were seen along some of the vessels. There was "silvery-looking" matter near the entrance of the vessels, in small

quantity; there was also a little streaking of the adjacent retina.

August 5, 1872.—He keeps well. The ophthalmoscopical changes to ordinary indirect examination are *nil*, and to direct examination they are no greater than those mentioned in the report of Case II, on which remarks will be made in the next Section.

At every visit the patient could read the smallest test-types. I tried him with Jäger's, Snellen's, Dixon's, and Williams's types, so that he did not read from memory.

(5.) Slight Changes in the Optic Discs in Cases of Cerebral Disease.

A case like the one mentioned in Section 4 not only shows that we may overlook a grave pathological condition of the end of one of the most important nerves in the body, unless we are in the habit of using the ophthalmoscope by routine, but it also leads us to attach extreme importance to the estimation of *very slight changes* in and about the discs. For the cases related in the last section, and other cases, convince me that very severe neuritis may leave such changes as would be entirely overlooked by anyone who did not examine the eyes with great care. The patient having no defect of sight, there would be no *impulse* to examine very carefully unless the observer were *told* that neuritis *had* existed some time before. Now suppose a patient comes to me for a nervous symptom, let us say for a one-sided convulsion, it is exceedingly important (compare Section 2) to know (that is when there is no neuritis and no atrophy after a neuritis) whether there *has been* any neuritis. Because, whether it be that there *is*, or only that there *has been*, neuritis, I should think it most likely that the convulsion depends on some tumour or other adventitious product; or, as it is usually put, that it depends on organic disease (*gross* organic disease).

I have in the concluding part of last section referred to a case I have reported, "Med. Times and Gazette," Nov. 30, there numbered Case II. In that case the patient's sight was good; he had had epileptiform seizures beginning in his left thumb.* Now we were certain that he had disease of *some kind* in the region of the left middle cerebral artery, the question was, Was there an adventitious product? The following is from the report of the case in the "Med. Times and Gazette," Nov. 10, 1872:—

"I at first thought there was no adventitious product. The optic discs by indirect examination looked normal, but on the patient's admission Mr. Kibbler found by *direct* examination that, besides white streaking along the vessels on the optic discs, there was also in one eye white matter about their convergence. These appearances were very much more marked on the right side. There was only a little streaking along the vessels on the left. I feel very much indebted to Mr. Kibbler for having drawn my attention to these appearances; for whatever they may mean, it is desirable not to overlook them. As I have seen such slight changes (see Case III, Section 4) after very severe neuritis, I believed this patient *had had* neuritis. His sight was good, and had never been affected; but this I am quite certain did not contra-indicate the diagnosis of neuritis (see remarks on Case III, in Section 4). However, such slight ophthalmoscopical appearances are so very common, that it was rash to attach so much importance to them as evidences of past neuritis; yet doing so led me to the correct diagnosis of an adventitious product. I may here most conveniently mention that the backs of the eyes, with the optic nerves, were removed, *post-mortem*, and examined microscopically, by Dr. Hermann Pagenstecher, who pronounced them to be quite normal."

So here it would appear that I was wrong in attaching

* In this case there was found a tubercle, the size of a hazel-nut, in the hinder part of the third *right* frontal convolution. The patient died of phthisis.

importance to slight changes about the discs, but I was not wrong in saying that only very slight changes are frequently found after neuritis. We have not often any knowledge of the state of the discs before the neuritis. In Case III (see Section 4), the discs were, I considered, normal before the acute neuritis appeared, but then I did not examine the eyes by the direct method, so that I cannot say that the *slight* changes, seen after the acute neuritis had disappeared (the streaking along the vessels and the silvery matter at their convergence), were not there before the acute neuritis came on. We often, in cerebral cases (cases of epilepsy for example) find trifling changes in the eyes about the discs—white silvery streaks along the vessels, white specks on the vessels, slight obscurity of some of them just beyond the disc, and at a little distance from the disc sudden bending of the veins; this bending suggests to me the limits of a former swelling of the optic disc. But as yet the interpretation of these appearances is doubtful; they, or some of them, may be only physiological peculiarities.

(6.) Stages of Optic Neuritis.

Since the physician sees optic neuritis in its earliest stage, and before there is any defect of sight to lead the patient to consult an ophthalmic surgeon, he has more often under his observation the whole of the different stages of neuritis. The physician will see more of those cases in which neuritis passes off leaving sight unimpaired. The ophthalmologist will most often see those cases in which the neuritis has existed for some time, and those cases of neuritis which go down to atrophy. Beginners in ophthalmology I feel certain take for *varieties* of neuritis what are different stages but of one process. If we take a marked specimen of neuritis early (especially before sight has failed) we may find the disc lost in an area about two or perhaps three times the

diameter of a normal disc. The arteries are not traceable in this area, the veins are lost here and there, and they suddenly dip at the edge and reappear beyond. The area is bespattered more or less, chiefly at its edge, with shapeless little blood-clots; there are also on the patch lustreless and shapeless white patches. This is what those will occasionally see who in cerebral disease disregard the patient's exclamation, "Oh, there is nothing the matter with my *eyes*," "I come for fits," &c. What those will often see who *wait until the patient says his sight has failed* (and sometimes it fails rapidly) is a uniform whitish swelling of the disc without many, if any, white patches or hæmorrhages; the disc is raised and slopes off into the fundus almost gradually. This is somewhat, like in appearance the "swollen disc" which occurs in some cases of tubercular meningitis not long before death. There are plenty of exceptions to these statements.

(7.) Two Cases of Uniocular Neuritis from Cerebral Tumour.

Uniocular optic neuritis is exceedingly rare in *Physician's* practice. Such a case from my practice, with an examination of each eye by Dr. Hermann Pagenstecher, is reported in these Reports, November, 1871, p. 130. In that case the neuritis was of the right eye. There was hemiplegia of the right side, and there was a large gliomatous tumour in the left hemisphere. The tumour was on the side opposite the neuritis. The left sixth nerve was paralysed; the cause of the palsy of this nerve was not discovered at the autopsy. When this man came in his case looked like an ordinary one of cerebral hæmorrhage, and that was my diagnosis. But when I discovered the neuritis, and when the palsy of the sixth nerve came on, I diagnosed tumour of the left cerebral hemisphere.

This year I had another case of almost exactly the same

kind. It has been briefly mentioned in the Hospital Reports of the "Brit. Med. Jour.," July 20, 1872, p. 67. There was neuritis of the left eye, left hemiplegia, and again there was a large tumour of the cerebral hemisphere (the right one). The tumour was therefore in this case also on the side opposite the neuritis. In this second case the existence of the neuritis and the similarity of the case to the first case led me to the confident prediction of tumour of the brain. Of course there were other symptoms—hemiplegia and much mental disturbance—but without the neuritis these very symptoms would have led to the erroneous diagnosis of local softening from thrombosis.

I used to say that *uniocular* neuritis did not occur from tumour of the brain *mass*. I can only say now that uniocular neuritis very rarely occurs even when but *one* cerebral hemisphere is diseased.

(8.) Optic Neuritis from Disease of the Cerebellum.

I have recently had under my care several cases of tumour in the cerebellum. I have adverted to one in Section 3 (I speak, of course, only of cases completed by autopsy). What I wish to remark now is that, so far as I can judge, there is not the least difference betwixt the optic neuritis produced by tumour of the cerebrum and that produced by tumour of the cerebellum—no difference in the ophthalmoscopical appearances I mean. In each there may be first of all no defect of sight; at a certain stage of each there comes a so-called "swollen disc;" and in each, if the patient lives long enough, the discs may lose all swelling and become flat and atrophic. In other words, and more generally, as I have many times urged, optic neuritis is *not a localising symptom*. From it, or from any stage of it, we cannot do more than infer that there is an adventitious product in some part inside the cranium, but whereabouts within the cranium that ad-

ventitious product lies has to be settled by other kinds of evidence. Optic neuritis is of no more value in localization than headache or vomiting is. If we find a reeling gait along with optic neuritis, the diagnosis of tumour of the cerebellum, or of tumour under the tentorium, is most probable.

Such a localising symptom is often not forthcoming in the *early* stages of a case of disease of the cerebellum, and in some cases it is absent throughout, as in the case mentioned in Section 3. We can then do no more than say that the adventitious product is probably either of the cerebral hemisphere or of the cerebellum. From the *position* of the headache, the great urgency of the vomiting, we cannot safely infer anything as to the position of the adventitious product. I say "adventitious product," because optic neuritis results either from tumour (syphilitic or not), or abscess, or in fact from any sort of "foreign body" in either of the great nervous masses.

(9.) Nervous Blindness and Nervous Deafness in Cerebral Disease.

From the first of my studies of amaurosis, I have been struck by the fact that blindness of nervous origin nearly always results, and deafness of nervous origin scarcely ever, I believe never, results from tumour of the cerebrum or of the cerebellum. Of course there are the exceptional cases of tumour so placed as to compress the auditory nerve itself; it is needless to say that there is deafness here. I have recorded a case of tumour of the cerebellum causing deafness in this way ("Med. Times and Gazette," June 17, 1865).

And of course, too, cases of deafness from organic disease of the ear with abscess in the cerebrum or cerebellum, have no bearing on the question; it is not the cerebral or cerebellar disease which causes the deafness in these cases;

it is the ear disease which causes the cerebral or cerebellar disease.

I have, however, seen two cases of intra-cranial disease in each of which there was deafness of both ears. In a case published in this Journal, Vol. iv, Pt. iv, p. 420, there was blindness and double and complete deafness along with tumour of the left cerebral hemisphere. But there was *also* a tumour the size of a hazel nut at the point of junction of the pons and medulla oblongata of the left side. Its very exact point of attachment could not be ascertained. Why, however, there was deafness of *both* sides I do not know. In this Journal, Vol. v, Pt. iv, I published a case (there numbered XXI) of a woman who was blind and deaf.*

Although in this case I was right in predicting an intra-cranial tumour—a very easy thing in such a case—I was wrong on two matters. I said (*op. cit.* p. 281):—

"I think the disease must be chiefly of the left cerebral hemisphere, and probably of its anterior lobe; but I equally think there must be disease lower down, and away from the cerebral hemisphere to produce the deafness—for, so far as I know, deafness to any considerable extent [I now say to no obvious extent] does not occur from disease of the cerebral hemisphere." This woman died about five years after these remarks were written, under the care of Dr. Claye Shaw, in the Metropolitan Asylum, Leavesden. He was so kind as to show me the tumour. It did not, as I had supposed, actually involve the cerebral hemisphere, but it grew from the floor of the sphenoidal fossa, and thus must have interfered with the

* Apart from my present object, this case is interesting as showing how long a patient may live after the first appearance of symptoms of intra-cranial tumour. She was first under Mr. Hulke's care in 1865, when she had optic neuritis, and at that time staggering gait. The case shows also the difficulty one has in keeping patients under observation. After being under the care of an ophthalmic surgeon, she was next under the care of a general physician (myself), and lastly, having become insane, she died under the care of an alienist physician, in the summer of 1872.

hemisphere by pressure at least; moreover the disease was on the *right* side. The only reason I had for thinking it to be on the left was that I had been told that the girl had had a *right*-side seizure, doubtfully epileptiform. No doubt it had really been on the left. But the point of importance for my present subject is as to the deafness. There was but one tumour; not two as I had imagined. But *in effect* there were two lesions, as the tumour extended so far back as the seventh pair of nerves. There was affection of the hemisphere (the patient *had become insane*) by the tumour, and the auditory nerve was *reached by it*. But it must be remarked that Dr. Claye Shaw found no palsy of the parts supplied by the portio-dura, which nerve also must have been in the way of pressure.

Whatever the explanation may be, the fact that blindness often, and deafness scarcely ever—never, I think—depends on disease limited to the cerebral hemisphere or to the cerebellum is very significant.

CURATOR'S PATHOLOGICAL REPORT.

By Edward Nettleship, F.R.C.S.,

Curator of the Royal London Ophthalmic Hospital Museum.

This Report is a continuation of those previously made, and includes nearly all the eyes removed at Moorfields between the date of the last Report and November, 1872, together with a good many which had been omitted from my earlier Reports.

In many cases the eyes lost by injury have no great pathological interest, and it seemed better therefore to condense the account of these specimens by recording their chief points in a tabular form; all the other specimens are described separately in more or less detail.

I intended to place at the end of the present account a short abstract of the most important observations recorded in this and the two preceding Reports. I found however that I should not be able to do this in time for the present number. I hope to append it to a future contribution.

The two following tables contain a short account of the eyes lost by the direct or indirect results of injuries. The *1st Table* contains a description of those in which foreign bodies were found; in the *2nd Table* are placed the eyes removed on account of perforating wounds, but in which no foreign body was found, and eyes ruptured by blows, &c.; while all cases of injury not coming under the above headings have been made into a *3rd Table.*

TABLE I.—EYES CONTAINING A FOREIGN BODY.

Name. Age, Date of Excision. Register No., &c.	Nature of Accident.	Time between Accident and Excision.	State of Injured Eye since accident and at time of Excision. State of other Eye.	Changes found in Excised Eye.
Man. Oct. 25th, 1872. No. 258. Couper.	Right eye wounded by chip of iron.	4 days.	Seen twenty-four hours after accident, and examined ophthalmoscopically by Dr. Buller. Wound at lower part of cornea, iris, and peripheral part of lens, passing towards a dark movable body in lower part of vitreous. Patch of blood in or on retina, below (erect image) O.D. Great pain and chemosis followed. Lens became opalescent. At time of excision there was still perception of light.	*Foreign body* (chip of steel size of half a lentil) found in a small cavity in upper part of vitreous just in front of ora serrata, and in contact with ciliary retina. A large clot of dark blood in lower part of vitreous, and a tolerably circumscribed collection of liquid pus in centre of vitreous communicating with the blood-clot. No blood patch in retina, or on it. *Retina in situ;* blotched over with lines and patches of white opacity, probably pus; otherwise transparent (examined quite fresh).
Walter G., 14. No. 117. Dec. 4, 1871. Right eye. Hutchinson.	Lacerated wound of cornea, iris, and lens by a piece of metal.	1 week.	Nothing known as to what became of metal.	The *foreign body* (piece of brass as large as a wheat grain) found in a large clot of blood in *vitreous* rather behind ciliary region; covered by soft greenish substance, but clean when rubbed. Many other large clots in vitreous. The borders of all the clots whitish, and passing insensibly into vitreous. No inflammatory products found microscopically, only altered blood. *Retina in situ,* transparent, and apparently normal.

TABLE I.—EYES CONTAINING A FOREIGN BODY (*continued*).

Name, Age, Date of Excision. Register No. &c.	Nature of Accident.	Time between Accident and Excision.	State of injured Eye since accident and at time of Excision. State of other Eye.	Changes found in Excised Eye.
Richard R., 22. Sept. 17, 1872. No. 242. Couper.	Right eye wounded by bit of cold steel.	1 month.	Seen immediately after accident. A. C. was full of blood, and there was a wound at inner side of cornea and iris. Afterwards the lens became swollen and opaque. At time of excision there was doubtful perception of light and the A. C. was shallow, but no increase of T. There was never much pain.	*Foreign body* found in midst of brick-red old blood-clot in contact with retina. The *retina* was not detached, and it as well as *choroid* appeared healthy to naked eye; *choroid* examined microscopically showed no changes.
Fredk. W., 23. May 1, 1872. No. 184. Left eye. Hulke.	Left eye wounded by a chip of iron.	5 weeks.	The doctor who attended him after accident said lens was wounded. Eye painful for several days after accident not subsequently. Had perception for two or three weeks after accident, At time of excision pupil blocked by a vascular pinkish growth of lymph from iris. Scar of wound extending from edge of cornea a short distance into sclerotic.	*Retina* detached from optic disc and choroid everywhere, and much thickened and shrunken. The small *vitreous* chamber full of soft puriform lymph, continued forwards to the mass in the pupil. A *piece of iron* was imbedded in it at lower and inner part; sharp-edged, flat, and about $\frac{1}{8}$ inch (3·12 mm.) square. *Lens* absent. *Subretinal space* filled by liquid blood. *Choroid* at part corresponding to foreign body thickened and covered by white lymph.
James D., 32. May 18, 1872. No. 196. Left eye. Hulke.	Left eye wounded by chip of iron size of a pea.	6 weeks.	Doubtful whether foreign body remained in or not. All sight lost immediately after accident. Not much pain in injured eye, but other eye became intolerant of light and remained so till after excision. T. of left —; eye somewhat shrunken. Horizontal scar across whole width of cornea.	*Lens* absent. *Retina* detached in umbrella form. A *flat piece of iron* as large as good-sized pea imbedded in soft opaque inflammatory substance within the shrunken retina. Subretinal space full of fluid blood.

Alfred F., 36. No. 81. August 28, 1871. Right eye. Streatfeild.	Believed to have been wounded by a stone.	2 months.	A piece of stone was taken out of right eye after the accident, and he believed that nothing was left in the eye. It continued painful and red from the accident until nearly the date of excision. Scar at lower and outer part of cornea; anterior synechia. No perception. No congestion or tenderness of eye on pressure. Pupil small, excluded. Lens opaque. Left eye normal.	*Lens* absent; its capsule thickened, opaque, and the two layers united into one. *Foreign body*, a flattish, rough, black chip, about $\frac{1}{12}$ inch (2·08 mm.) square, probably iron, possibly stone, encapsuled firmly in white tissue at upper and inner part. It lay upon the ciliary processes, between them and margin of lens capsule, and had no doubt penetrated the lens from side to side. *Iris* adherent in part to lens capsule in part to scar. *Ciliary body* somewhat thickened near to foreign body. *Vitreous* fluid and stringy at lower part, elsewhere normal. *Retina* and *choroid* normal to naked eye. No microscopical examination of any part.
Wm. P., 60. May 21, 1871. No. 199. Right eye. Bowman.	Right eye wounded by small chip of iron.	7 months.	He thinks chip of iron dropped out of eye. Severe inflammation for six weeks. Eye then remained quiet till two months before excision, when it became extremely painful and remained so till removed. Lost much flesh from the pain and want of sleep. Could see large objects till about one month before excision. Eye was good before accident. Left eye normal at time of excision. At time of excision—Right eye: Cornea slightly roughened; a triangular patch of dotted opacities on lower part of posterior surface. Pupil oval, with apex pointing upwards and outwards. Conjunctiva somewhat swollen, and especially so at outer and upper part where a spot of congestion marks probable seat of wound.	*Chip of bright iron* rather firmly glued to ciliary body, close to ora serrata at lowest part of eye. *Lens* looked normal but had a patch of whitish, cheesy-looking matter on upper part of its posterior surface, probably old inflammatory matter marking track of foreign body close to lens. *Vitreous* became gelatinized in Müller's fluid from albuminous infiltration. *Retina* and *choroid* healthy to naked eye.

TABLE I.—EYES CONTAINING A FOREIGN BODY (*continued*).

Name, Age, Date of Excision. Register No. &c.	Nature of Accident.	Time between Accident and Excision.	State of Injured Eye since accident and at time of Excision. State of other Eye.	Changes found in Excised Eye.
Wm. A., 28. May 6, 1872. Left eye. Hutchinson.	Left eye cut by a chip of steel.	8 years.	The eye gradually failed for six years after accident, when sight was entirely lost. Very little pain in it till ten months before excision, but during that period had occasional attacks of pain. First noticed white opacity in pupil ("cataract") four months before excision. No perception. Right eye had muscæ for five weeks before removal of L. but V. was perfect.	*Foreign body*, a chip of iron as large as a lentil, encapsuled *on outer surface of sclerotic* at outer and lower part of equator. No scar visible anywhere on inner or outer surface of eye. Corresponding to the foreign body, but within the eye, a thick band of scar tissue between choroid and retina passing forwards and ending in a patch of exposed sclerotic near ora serrata, between inferior and external recti; this patch of bare sclerotic no doubt marks seat of entrance of foreign body, which must have passed straight backwards and cut its way out again. It is remarkable that there was *no puckering whatever of the sclerotic*. Other lines of white scar tissue passed in various directions between choroid and retina, some of them ending in little pigmented masses consisting of old blood; these pigmented masses contained no metal. *Retina in situ*, hazy, and containing lines of old blood near the track of the foreign body. *Vitreous* fluid and nearly colourless. *Lens* soft and milky white. *Pupil* excluded.

Thomas S., 39. July 22, 1872. No. 219. Right eye. Hutchinson.	Right eye injured by a piece of cold steel.	14 years.	At time of excision R. eye was painful, and L. irritable.	No appearance of wound in sclerotic. *Cornea* has a wide, nearly round opacity at upper and inner part, resembling a healed ulcer. Area of pupil white. *Vitreous* too soft (examined in fresh state). *Retina* and *choroid in situ.* A small dark-coloured *foreign body*, size of large pin's head, just behind ora serrata at temporal side and rather below horizontal meridian; not covered by retina or choroid; its base surrounded by a narrow zone of pale choroid.

Table II.—EYES WOUNDED OR RUPTURED, BUT NOT CONTAINING A FOREIGN BODY.

Robert R., 46. Oct. 20, 1871. No. 102. Bowman.	Eye wounded by a shot-corn fired from about 80 yards' distance.	6 days.	Notes by Mr. Rogers at date of excision. "Wound at upper and inner edge of cornea through iris and lens. Lens-substance in corneal wound. No A. C. T−1. Perception of light feeble, field central."	The shot could not be found in the eye. After careful search a small slit-shaped hole was found in outer surface of sclerotic just at situation of yellow spot. Corresponding to this was a quantity of blood in vitreous, which adhered to retina and choroid; after hardening in alcohol, blood was picked away and a ragged hole in retina and choroid found beneath; this aperture was (after allowing for accidental tearing in removing the blood) considerably larger than that in sclerotic, through which only about No. 6 eye-probe would pass.

TABLE II.—EYES WOUNDED OR RUPTURED (*continued*).

Name, Age, Date of Excision. Register No. &c.	Nature of Accident.	Time between Accident and Excision.	State of Injured Eye since accident and at time of Excision. State of other Eye.	Changes found in Excised Eye.
James T., July 27, 1872. No. 222. Hulke.	R. eye injured by a piece of steel.	9 days.	Notes by Dr. Buller. "The bit of steel was supposed to be in the eye at time of excision. Wound near lower margin of cornea and iris, the latter being wounded at its ciliary attachment."	Foreign body could not be found, but besides the corneal wound, a slit-shaped aperture through all the coats of the eye, about $\frac{1}{10}$ inch (2·5 mm.) long, existed a short distance below the O. D. Vitreous contained blood and white opacities, probably pus. *Retina in situ* and transparent (examined immediately after excision). Lens normal.
Geo. T., 5. March 25, 1872. No. 164. Hutchinson.	L. eye wounded by a pair of scissors thrown at him by his mother while in a passion.	3 months.	Seen two weeks after accident by Dr. Morris Tonge, of Harrow. Then had a wound through lower and outer part of cornea, with prolapse of iris, but no inflammation. Could then read large print. Gradually a yellowish reflex appeared at back of lens, and increased. Had occasional congestion of eye, but no pain or decided inflammatory symptoms. At date of excision, L. eye congested in ciliary region, T. much diminished, a yellowish reflex from fundus, lens transparent, no A. C., anterior synechia, scar on cornea.	After chromic acid one month, the eye was examined. *Retina* detached in the usual way, but at hyaloid fossa puckered up into folds like the mouth of a bag drawn together by a running string. A considerable vitreous chamber still present and containing transparent fluid with flocculi in it. Subretinal space filled by rather firm, gelatinous material. *Lens* and *iris* in contact with cornea. O. D. much swollen.

Thos. F., 35. Feb. 2, 1872. No. 140. Couper.	L. eye wounded by a butcher's knife.	4 months.	Sight lost completely immediately after accident. Did not have much pain afterwards. At date of excision, L. eye T. —; somewhat shrunken; iris same colour as in other eye; slight general scleral congestion; nearly vertical scar, extending quite across cornea, and for $\frac{1}{10}$ inch (2·5 mm.) into sclerotic, above and below; no A. C.; doubtful perception. Right eye normal.	*Lens* absent. *Vitreous* considerably diminished, opaque, tough, concentrically laminated, consisting of closely felted finely-beaded fibres. *Vitreous* at posterior half of eye detached from retina, and its place taken by blood-clot altered into soft, spongy, greyish, albuminous, or fibrinous mass. *Retina* detached almost everywhere, except from O. D. and ora serrata; subretinal space contained partly decolourised blood, of consistence like that in sub-hyaloid space; immediately on outer surface of retina a thin layer, in which were a great many large round inflammatory corpuscles. *Optic nerve* wasted both in and outside the eye.
Alfred T., 13. Feb. 16, 1872. No. 149. Couper.	R. eye wounded by a packing needle.	4 months.	For two days after accident could see large objects, but after that all sight was lost. Much pain followed, and he was confined to bed by it twelve weeks. Pain was in eye, side of nose, and all over head. A short time before excision of R. the other eye became intolerant of light, and ached; recovered a day or two after operation. At time of excision—R. eye: Cornea pitted, and universally hazy, more so at lower part; iris grey-blue, with several blood-spots on its surface.	Eye much shrunken and puckered; no scar found on careful examination in recent state. Chromic acid three months. *Retina* detached, and shrunken into solid mass; *subretinal space* full of coagulated substance. *Sclerotic* and *cornea* considerably thickened. *Lens* in contact with cornea, and rendered too convex.
Priscilla H., 15. Jan. 2, 1872. No. 129. Couper.	L. eye wounded at Stowmarket gun-cotton explosion.	4½ months.	At time of excision—L. eye: No perception; A. C. full of blood; pupil wide; several small corneal opacities, but no large scar.	Eye shrunken and squared. Large scar at upper and outer part of sclerotic, near insertions of recti. No foreign body found. *Lens* transparent but displaced upwards towards wound, and made too convex apparently by pressure against coats of eye near wound. *Retina* detached in umbrella form, but much thickened and distorted. *Subretinal* fluid clear and reddish.

TABLE II.—EYES WOUNDED OR RUPTURED (*continued*).

Name, Age, Date of Excision. Register No. &c.	Nature of Accident.	Time between Accident and Excision.	State of Injured Eye since accident and at time of Excision. State of other Eye.	Changes found in Excised Eye.
Eliza H., 37. April 15, 1872. No. 172. Hutchinson.	L. eye lacerated by glass.	7 months.	Seen almost directly after accident and excision advised, but deferred at patient's wish. Seven months later she came again because she thought R. eye had lately got rather "weak." L. was at this time a good deal shrunken and showed a large scar at lower and outer part; no perception; not painful.	Examined fresh. Umbrella detachment of *retina* up to ora serrata; *subretinal space* full of bloody fluid. *Lens* semi-opaque, its anterior capsule streaked with radiating opacities. Very numerous minute elevations on inner surface of *choroid*, so-called "colloid" bodies; all very small and covered by epithelium of choroid; they formed a broad, closely packed belt at equator, and were fewer in number elsewhere. Scar on sclerotic $\frac{1}{2}$ inch (12·5 mm.) long, about $\frac{1}{8}$ inch (3·12 mm.) behind sclero-corneal junction. No A. C. *Cornea* clear. No microscopical examination.
Chas. H., 14. Aug. 1, 1872. No. 224. Streatfeild.	L. eye wounded by a piece of wire. The wire came out again.	18 months.	The eye was painful for a fortnight after accident, and then remained quiet till three weeks before excision, when it became somewhat "watery" and irritable, but not definitely inflamed. Says he had no sight with it after accident. At date of excision, L. eye was much shrunken, and the cornea showed a long vertical opacity with anterior synechia. Small occluded pupil. Iris blue. Cornea crossed horizontally, rather below centre, by a broad band of dull opacity slightly raised above surface.	Eye squared. Müller's fluid six weeks. *Retina* detached in usual way, and much shrunken; it adhered to a spot about midway between O. D. and ciliary body at outer side, and on examination this proved to be scar of wound in sclerotic, close to anterior border of insertion of inferior oblique. Edges of sclerotic as usual turned in. No foreign body. *Subretinal space* full of the coagulated, opalescent, albuminous material so common in this situation and in the vitreous when highly infiltrated with albumen; this substance is always soft, gelatinous, and brittle, with a slightly granular surface, and reminds one, when broken, of apple-jelly.

Charles C., 21. June 30, 1871. No. 52.	L. eye wounded by glass.	16 years.	A medical man who saw him just after accident said there was no glass in the eye. All sight was lost immediately, and the eye never gave any further trouble. Was quite quiet and painless at time of excision. Excision done on account of neuritis of R., with great swelling of O. D. This was supposed at the time to be sympathetic, but symptoms which came on afterwards led to the diagnosis of intra-cranial tumour. When last heard of, the patient had been "in a state of stupor" for many weeks.	Eye shrunken, puckered, soft in front, firm behind. *Cornea* clear, small; a scar at lower margin. *Lens* absent. *Retina* detached; separated from choroid behind by a thick mass of *bone* which did not pass forwards to front of eye.
Elisha W., 19. April 20, 1872. No. 176. Wordsworth	L. eye pricked by a thorn. Fresh attack of inflammation.	12 years. 6 weeks.	Sight was much and permanently damaged by the prick. Since then had frequent attacks of pain in the injured eye, and intolerance of light by both. 5—6 weeks before excision L. became much inflamed and painful. At time of excision, L. cornea showed patchy haziness and some small superficial vessels running towards centre. Pupil very large and irregular; its area occupied by streaky opacities, as if after needle operations. Conjunctiva œdematous and red. He was aware of the eye having been enlarged, "projecting," only since recent inflammation.	Globe elongated by general ciliary bulging; it transmitted light well. The tendons of the muscles unusually wide and thick. From cornea to Y. S. 1·2 in. (30 mm.): vertical diameter at equator, 1·1 in. (27·5 mm.); horizontal diameter at equator, 1·06 in. (26·5 mm.). Chromic acid six months, at the end of which time sclerotic was not well hardened. Posterior part of *vitreous* fluid and clear, anterior part stringy and opaque. *Choroid* and *retina in situ*; both looked thin, but not otherwise altered. O. D. very deeply cupped, its edge however only overhanging at one part, and there only slightly; its nerve-fibres seem to be not entirely atrophied. *Lens* a concave disc, its opaque margin thicker than semi-transparent centre. Lower part of its edge very firmly adherent by tough tissue to one or two of the ciliary processes, but no scar could be found on outside of corresponding sclerotic, nor any foreign body in the tough fibrous tissue mentioned. Pupil wide and irregular from posterior synechiæ.

TABLE II.—EYES WOUNDED OR RUPTURED (*continued*).

Name, Age, Date of Excision. Register No. &c.	Nature of Accident.	Time between Accident and Excision.	State of Injured Eye since accident and at time of Excision. State of other Eye.	Changes found in Excised Eye.
Thos. M., 39. Feb. 9, 1872. No. 144. Couper.	R. eye wounded by a sharp spike, which passed through lower lid.	20 years.	Three weeks after accident an operation was done on the eye which patient thought gave him some sight for a few weeks. Sight then failed completely. Eye occasionally painful since that time, and for a few weeks before excision it was especially so. Ten days before excision inflammatory œdema of the lids of *both eyes* set in; it is doubtful whether the attack began with inflammation of R. eye. A scar present at edge of right lower lid. L. eye often became dim when R. was in pain.	Eye considerably shrunken. A scar ½ inch (12·5 mm.) long, and much puckered, behind insertion of inferior rectus. *Cornea* opaque near scar. *Iris* greenish, dragged towards scar, and showing a small hole at one part. *Lens* calcified, shrivelled, and adherent by one side to scar. Old *cyclitis* and equatorial *choroiditis*, evidenced by tough fibrous tissue on ciliary body which sent back some white bands to inner surface of retina, and by numerous spots of heaped-up pigment at equator of choroid, most numerous in lower and outer part. *Retina in situ*, looked too thin, its inner surface covered by minute elevations. *Vitreous* fluid and clear. *Iris* free, except at scar. *Sclerotic* somewhat too thick. Chromic acid 2 weeks.
Henry H., 55. Oct. 28. 1872. No. 260. Hutchinson.	L. eye lost gradually after perforating wound of upper lid and orbital tissues by large piece of gun-barrel. The piece of barrel was pulled out.	45 years.	Sight failed gradually, and was entirely lost about fifteen years after accident. A few weeks after accident was told by his medical attendant that there was a cataract which might be couched. Eye never painful until R. eye lately became affected with corneal ulcer. At date of excision, L. cornea vascular and opalescent but of normal size.	Examined fresh. Eye slightly shrunken. *Vitreous* clear; fluid behind; apparently normal in front. *Lens* for most part of chalky whiteness, but superficial layers clear; displaced upwards towards scar in *sclerotic*. *Retina* transparent and *in situ*. *Choroid* abundantly springled with pigment accumulations, signs of past inflammation; many of them probably in retina. At upper part, in front of equator, a very large patch completely atrophied and showing sclerotic through; the latter on section proving to be a good deal thickened at that spot, and to a less degree everywhere else. This spot of

				thickened sclerotic and atrophied choroid corresponded to the position of an old scar in sclerotic, and no doubt marked the seat of a perforating wound. The *choroidal pigment* is in small dots and lines of perfectly black colour; the small dots are often more or less confluent, but never to the extent of forming large uniform black patches. The pigment deposits are almost uniformly distributed all over the choroid, and there is a black spot at the *macula lutea*. The choroidal stroma between the pigment spots is considerably atrophied. This specimen is very interesting, proving as it does the occurrence of non-suppurative choroiditis and secondary retinitis pigmentosa as the result of injury. No micro-copical examination.
Elizabeth T., 8. April 30, 1872. No. 183. Bowman.	R. eye wounded by a fork.	Unknown.	At date of excision, notes on her letter, "R. eye, traumatic cataract. T. +, pain on pressure." Scar near edge of cornea, anterior synechia, pupil slit-shaped and displaced towards scar. Iris blue.	Eye rather shrunken. Opened at once. *Lens* absent. A layer of old white tough tissue on back of *iris* near pupillary border, passing near scar of wound into a lump of slightly vascular soft tissue as large as a hemp-seed and occupying position of lens. This lump gave off a semi-opaque thread into vitreous, which reached to equator and lay midway between the axis of the eye and the retina and consisted of branched and round corpuscles, awl-shaped blood-crystals (? hæmatoidin), and granular matter. The other structures looked healthy, except vitreous which, though of normal consistence, was slightly yellow. Recent inflammation of an old scar produced in this case tissue probably like that of a granulation with new vessels; some of the inflammatory tissue spread into the centre of the vitreous, which at the same time became stained by slight hæmorrhages from the vessels of the inflammatory tissue in front. This case illustrates remarkably well the manner in which inflammation of the vitreous depends for its existence on inflammation of some of the parts around it.

TABLE II.—EYES WOUNDED OR RUPTURED (*continued*).

Name, Age, Date of Excision. Register No. &c.	Nature of Accident.	Time between Accident and Excision.	State of Injured Eye since accident and at time of Excision. State of other Eye.	Changes found in Excised Eye.
A boy, 14. Jan. 29, 1872. No. 139. Streatfeild.	Eye shot by an arrow from a bow.	About 10 days.	At time of excision, a jaggy contused wound with swollen edges in ciliary region, partly scleral partly corneal. Wound filled with puro-lymph.	Uniform suppuration of *vitreous*, the mass of pus into which it was converted already beginning to degenerate, as shown by the characters of many of the corpuscles. Suppurative inflammation of *retina* and uveal tract, most advanced in front and gradually diminishing behind; *choroid* apparently normal near O. D.; *retina* everywhere enormously thickened, recognizable behind but in front blended with the purulent vitreous. Plug of lymph in wound continuous with vitreous. Lens apparently normal. *Retina* slightly separated from choroid behind by tough fibrinous matter in which were a few pus corpuscles. Slight thickening of anterior part of *sclerotic*. Müller's fluid one month. The period (ten days) given as having elapsed between accident and excision is probably somewhat too short, considering the advanced state of suppurative inflammation found in all parts of the eye.

Sydney P., 14. Nov. 16, 1871. No. 110. Hutchinson.	R. eye wounded by a piece of tobacco-pipe which rebounded from a cross-bow that he was firing.	11 days.	Sight lost immediately after accident. Treated for ten days with belladonna fomentation. Had occasional pain, but not severe. At time of excision, V. barely shadows; T. n., globe very tender. A large curved wound of cornea containing prolapsed iris. Iris greenish.	Many large *blood-clots in vitreous; vitreous* itself normal, except yellowish tint; no inflammatory products visible under microscope. *Lens* absent. *Retina* for the most part *in situ;* about $\frac{1}{10}$ inch (2·5 mm.) to inner side of O. D. a *small rent* through its structure filled with blood-clot, both retina and blood-clot at this spot being firmly adherent to choroid beneath; the *choroid itself not perforated.* No doubt this marked the seat of a contused wound of retina by the bit of tobacco-pipe. At Y. S. there was also a large rent in retina; its edges here were curled inwards towards vitreous, not adherent to choroid or to blood-clot, and it was probably made in opening the eye. Some thin patches of blood between retina and choroid in various parts. Examined fresh.
Samuel G., 22. April 2, 1872. No. 168. Couper.	L. eye shot by a piece of wood discharged from a catapult.	12 years.	Eye was painful for about a year after accident, and after that remained quiet for several years. During the last few years again became sometimes painful, and lately the other (R.) eye has been sometimes dim. At time of excision, L. eye shrunken, soft, tender, a vertical scar in cornea.	Examined fresh. *Retina* detached and shrunken, attached at O. D., and adherent in front to back of lens and to much inflammatory tissue present on back of ciliary body. *Vitreous* chamber practically obliterated, but opposite surfaces of retina not in the least coherent. *Choroid* at equator studded somewhat abundantly by little white soft pedunculated bodies, which were easily detached; not examined with microscope; none except at equator. *Lens* shrunken to a mere remnant. *Subretinal space* contained a great deal of cholesterine floating in fluid.

TABLE II.—EYES WOUNDED OR RUPTURED (*continued*).

Name, Age, Date of Excision. Register No. &c.	Nature of Accident.	Time between Accident and Excision.	State of Injured Eye since accident and at time of Excision. State of other Eye.	Changes found in Excised Eye.
Wm. M., 24. April 8, 1872. No. 170. Streatfeild.	R. eye wounded by large piece of red-hot steel.	7½ weeks.	Says that immediately after accident he could only see shadows, and asserts that he could still see as much at date of excision. For a few days after accident had pain in injured eye, but it then became quiet. About three weeks after injury a piece of prolapsed iris cut off by Mr. Streatfeild. Three or four days before excision of R. the L. eye became inflamed, painful, and misty, and at latter date there was sympathetic iritis, with steamy cornea, and much congestion, but the eye was not tender.	Examined fresh. Scar in cornea and sclerotic at upper part. Eye slightly shrunken and squared. *Lens* absent; its place taken by a plug of lymph, which adhered to corneal scar. *Vitreous* clear. *Retina* slightly detached in numerous folds, but still very transparent (probably the slight opalescence which was present was the result of post-mortem change, the eye having been kept forty-eight hours). *Y. S.* looked normal, and was of healthy colour. Great thickening of *choroid* at back and outer part of eye, including parts around O. D. and at Y. S., while at outer side of eye a thin layer of blood-clot lay between the sclerotic and thickened choroid. The inner surface of the thickened and detached choroid slightly wrinkled. Choroidal epithelium normal everywhere. No microscopical examination.
Wm. P., 47. Oct. 3, 1871. No. 96. Lawson.	R. eye injured (probably wounded) by a piece of blunt red-hot iron, as large as a finger.	3 weeks.	At time of excision a large transverse scar on cornea, with prolapse of iris.	No record.
Thos. V., 21. Aug. 12, 1871. No. 73. Hulke.	L. eye burst by a blow.	4 days.	Seen four days after accident. Much chemosis; blood in A. C. No perception.	Ruptured at outer side of globe. Eye full of blood. Lens absent. Retina detached, broken up, and mixed with blood.

TABLE III.—EYES LOST BY BLOWS, SCRATCHES, &c.

James K., 52. May 11, 1872. No. 191. Bowman.	R. eye struck by a stick.	8 days.	Vision was lost directly after the blow; it was good before. Rupture of sclerotic apparently near corneal edge, and occupying the upper semi-circumference. Recent bulging scar at seat of rupture.	Chromic acid five months. Sclerotic very hard. On careful examination, the seat of rupture was found to be the sclero-corneal junction just in front of ciliary processes. No trace of lens, its capsule, or the iris. *Vitreous* opaque (from albuminous infiltration) but of normal consistence, and containing two large clots of blood. Moderate uniform thickening of *retina*, with a few slight inward duplications, the whole membrane being separated from choroid by a nearly uniform layer of fluid, about $\frac{1}{25}$ inch (1 mm.) in thickness. All these appearances doubtless due to œdema. No naked eye change in *choroid*. No microscopical examination.
Hannah B., 57. May 14, 1872. No. 195. Critchett.	L. eye struck severely by a chair.	3 months.	Both eyes were before much damaged; they inflamed at æt. 14, and the sight had been bad ever since. Probably L. was glaucomatous at time of accident, for she could see only to temporal side with it, and at time of its excision R. was glaucomatous, and iridectomy was done.	Eye much shrunken and puckered; *O. N.* wasted; *cornea* prominent, vascular, semi-opaque. Rupture at or close behind sclero-corneal junction. Lips of wound separated by $\frac{1}{10}$ inch (2·5 mm.); both edges turned inwards. *Cornea* thickened everywhere, more so near wound. *Retina* absent, except a small button at O. D.; it had been torn off and escaped with the vitreous. Yellow, clear fluid in subretinal space. No *lens*. A layer $\frac{1}{8}$ inch thick (3·12 mm.) of tough pinkish tissue (no doubt organised blood-clot) between choroid and retina, on side opposite to rupture; the bleeding would be more likely to occur there than near wound, on account of the dragging produced by the escaping vitreous and retina.

TABLE III.—EYES LOST BY BLOWS, SCRATCHES, &c. (*continued*).

Name, Age, Date of Excision. Register No. &c.	Nature of Accident.	Time between Accident and Excision.	State of Injured Eye since accident and at time of Excision. State of other Eye.	Changes found in Excised Eye.
John B., 19. March 17, 1872. No. 161. Streatfeild.	L. eye struck by a fist.	3 months.	The eye was "blackened" (ecchymosis of lids), and he could never see more than shadows after the blow. Could still see shadows at date of excision. There had been no pain lately, and the other eye was normal.	Size and shape of eye normal, except cornea, which was opaque and staphylomatous. Müller's fluid two months. The *sclerotic* did not harden well. The *vitreous* and *retina* were both in an early stage of suppurative inflammation, and much recent lymph covered inner surface of *ciliary body*. In the *retina* the principal changes were—1st, the existence of numerous little foldings, which projected into the vitreous, and were due, partly no doubt to an increase in the area of the retina by inflammatory œdema; 2nd, numerous minute circumscribed collections of pus corpuscles in the nerve-fibre layer, many of which had perforated the internal limiting membrane, and projected inwards against the hyaloid. The *hyaloid* itself at the posterior half of eye separated with great ease from retina, and its outer surface was thickly spotted and streaked with little sand-like dots and lines of opacity, all consisting of well-formed pus-corpuscles. The pus was gathered into round masses, which were often collected together close to the larger retinal vessels, and thus produced the appearance of opaque lines on the hyaloid, having the same arrangement as the vessels. The observation is interesting, as pointing to the retinal vessels as the

				source of the pus at the back of the vitreous in this and similar cases. *Choroid* looked normal to naked eye, except that it was slightly detached from sclerotic in front of equator. *Lens* rather shrunken equatorially, and so a little too convex. *Cornea* thickened, except at one part, where is a scar of a perforating ulcer thinly healed over, and containing iris prolapsed into it.
George A., 53. June 27, 1871. No. 50. Lawson.	Right eyelid struck by a stone; the eye itself believed not to have been injured.	4 months.	The eye had been damaged thirty years before after small-pox, but retained fair sight. After injury, it rapidly inflamed; cornea ulcerated and perforated. Was quite blind with injured eye for at least two months before excision. At time of excision.—T. +; eye congested; cornea hazy, and at seat of perforation staphylomatous. No A. C. Large upper and lower equatorial staphyloma.	Large staphyloma just behind insertion of superior and inferior recti. *Sclerotic* and *choroid* uniformly thinned at staphylomatous parts; corresponding part of *retina* slightly separated in little patches from choroid. *Vitreous* normal, but hyaloid unusually adherent to retina at ora serrata, and for a short distance behind it; this adhesion was perhaps the cause of the slight retinal separations, or the latter may have been due to inflammatory œdema, which induced after changes in the hyaloid. *Lens* appeared normal. *Ciliary body* thinned, and area within ciliary processes enlarged; suspensory ligament stretched. O. D. not cupped. Examined after four days' chromic acid treatment.
Wm. F., 39. March 12, 1872. No. 159. Lawson.	R. eye struck by a stick.	4 months.	The eye said to have become "quite blind" directly after accident, and to have bled a good deal. For next three weeks it was very painful. At time of excision it was shrunken, soft, and tender when pressed. The L. eye was quite normal.	*Vitreous* full of pinkish, soft, fibrinous-looking but friable matter, containing a few blood-corpuscles and some products of degeneration: probably old blood-clot.

TABLE III.—EYES LOST BY BLOWS, SCRATCHES, &c. (*continued*).

Name, Age, Date of Excision. Register No. &c.	Nature of Accident.	Time between Accident and Excision.	State of Injured Eye since accident and at time of Excision. State of other Eye.	Changes found in Excised Eye.
Mrs. G., 58. Sept. 25, 1872. No. 249. Hulke.	Blow on R. eye.	4 months.	Never saw more than shadows after accident. Great pain and glaucomatous tension followed, and iridectomy was done about two weeks after accident, which relieved pain. About four weeks before excision, however, painless sympathetic inflammation of other eye set in, and at date of excision it was as follows:—L. eye, sympathetic iritis, with bulged iris of greenish colour; pupil excluded and perhaps occluded, its area white, cornea (or aqueous?) rather dull. No congestion. T. n. (or — ?) R. eye—Cornea steamy on anterior surface, and showing numerous white dots on posterior surface, especially at lower part (keratitis punctata). Iris blue, slight posterior synechia at lower part. Lens displaced into vitreous, where it moves freely about; it is opaque and white.	Hardened in alcohol. *Lens* found at lower and inner part of vitreous, on hinder part of ciliary body; its capsule *in situ*, and slightly adherent to iris. *Vitreous* contained a little fluid, but was for most part tough and stringy in front, granular and flocculent behind, and everywhere opaque from albuminous infiltration. Inflammatory corpuscles found in abundance in hyaloid covering ciliary body and suspensory ligament. *Choroid* much thickened behind, especially about Y. S., the change gradually diminishing from behind forwards, so that in front the choroid looked normal. *Retina in situ*, and showing no macroscopic changes.

James K., 46. Feb. 13, 1872. No. 148. Critchett.	Blow on L. eyeball (not eyelids he believes) by a horse's bit.	7 months.	Eye was painful and red for about two weeks after accident, then got quite well and he thought no more about it till two months before excision, when it became gradually inflamed and very painful again. The pain continued till excision. Sight lost five weeks before operation. Came to hospital about ten days before excision with cornea perforated by an ulcer, and iris prolapsed into wound. The pain was probably due to the corneal ulceration, and not to any more deeply seated changes.	Immediately after excision on upper and outer part of cornea, quite away from the ulcerated surface, were two vesicles; they were thin, contained clear fluid, were rather abruptly raised above surface, of irregularly elongated forms, and one much larger than the other, the larger being quite $\frac{1}{8}$ inch (3·12 mm.) long by $\frac{1}{20}$ inch (1·25 mm.) wide. No *A. C. Iris* blue grey, apparently healthy. Chromic acid ten days. *Vitreous* in an early stage of inflammation, showing moderate general haze and containing numerous large inflammatory cells, mostly round, but some stellate. Lens slightly opaque, perhaps from chromic acid. Retina and choroid *in situ* and not obviously diseased, but not examined microscopically.
Margaret D., 51. Jan. 2, 1872. No. 128. Bowman.	L. eye struck by a fist.	7 months.	Vision with L. eye reduced directly after accident to perception of large objects, and in about three months lost altogether. At date of excision—L. eye, no perception; A. C. full of blood; pupil very wide; T. —. Much pain present ever since accident, and this was worse for two or three weeks before excision. R. eye highly myopic, with very large patches of choroidal atrophy at region of Y. S.	Eye much elongated by presence of a large posterior staphyloma at region of Y. S. Length from centre of cornea to most prominent part of staphyloma $1\frac{3}{10}$ inch (32·5 mm.). Retina detached from choroid, as far as ora serrata, still attached at O. D, and also by a thin cord of stretched retinal tissue to the most bulging part of staphyloma. Subretinal space full of blood. Lens opaque at centre, otherwise normal. Staphyloma very large, and formed entirely by the sclerotic considerably thinned, the choroid terminating by any apparently abrupt edge all round the bulging part, and being quite absent from the staphylomatous area itself. Much diffuse stretching of choroid. Chromic acid three days. A cast of this eye kept in the museum, as well as the specimen itself.

TABLE III.—EYES LOST BY BLOWS, SCRATCHES, &c. (*continued*).

Name, Age. Date of Excision. Register No &c.	Nature of of Accident.	Time between Accident and Excision.	State of Injured Eye since accident and at time of Excision. State of other Eye.	Changes found in Excised Eye.
Caroline C., 41. March 22, 1872. No. 162. Critchett.	She struck her L. eye against the corner or edge of some metal article.	18 months.	Ulceration of cornea followed the blow, and an operation was done for it at St. Bartholomew's Hospital; the eye, however, became blind afterwards. At date of excision, there was also a vascular ulcer of R. cornea of some standing, for which an operation was also done at the same hospital, and a second operation (peritomy) was performed at Moorfields, when L. was excised. It seems probable that the ulceration of L. cornea was simply initiated by the blow, and that the latter was only remotely the cause of the eye being lost.	Eye much shrunken. *Cornea* represented by a small semiopaque disc of scar-tissue; four deep grooves radiate from it to the centres of insertion of the recti. Chromic acid seven months. *Vitreous* contained a large clot of red blood, and much whitish cheesy matter. Partial detachment of retina in folds whose outer surfaces are in close apposition. Cheesy soft substance in subretinal space. No *lens*.
Wm. K., 62. Feb. 22, 1872. No. 151. Streatfeild.	L. eye struck by a stick one end of which sprung back against the eye.	2 years.	The eyelids were not "black" after the accident, and the eye itself only a little "blood-shot." Sight lost almost directly after accident and quite extinguished a day or two later. He did not notice any enlargement of the eye. For two months before excision had pain across forehead bad enough to keep him awake. About same time R. eye failed, and on examination at date of excision of L. showed. a condition of well-marked neuritis. V. of R. was then only shadows. The frontal pain was completely relieved	Examined twenty-four hours after excision, after being kept in wet lint; T., then much +. Corneal epithelium rough, and in parts semiopaque; a minute hemispherical, clear elevation, like a vesicle, near one margin. Iris light brown. Globe transmitted light well. Large equatorial staphyloma, complete, but much the most marked between superior and external and between external and inferior recti. Tendons of all muscles unusually thick and wide. Chromic acid a few days; a cast then taken of the eyeball, to show the staphyloma at equator. Globe then divided at equator.

			by the excision; he had not referred it to the L. eye.	No naked-eye changes sufficient to account for complete loss of sight immediately after accident, and probably patient's statement to that effect was erroneous. *Retina* appeared normal from equator backwards. *O. D.* not cupped. At equator retina became closely adherent to the much attenuated chyroid. The *choroid* itself was so atrophied at the equator as to be barely recognisable, and elsewhere was more or less atrophied; the hinder part of *ciliary body* was atrophied, but ciliary processes looked normal. *Lens* absent; its capsule formed a thin septum across ciliary area, with some patches of opacity in it; no adhesions to iris. It is not unlikely that the lens-capsule may have been ruptured by the blow; the rapid failure of sight would then be accounted for by swelling and opacity of lens. The *vitreous* was opaque, tough, and gelatinous. No microscopic examination of any part. No scar anywhere.
Susan W., 19. Feb. 15, 1872. No. 150. Hutchinson.	L. eye struck by her own hand, which slipped as she was lacing her boot.	5 or 6 years.	Sight was much damaged directly after accident, and quite lost in a few days. The eyelids did not turn "black" after blow, nor was eye much inflamed. She thinks damaged eye did not differ much in appearance from the other till two or three years after accident, when it began to enlarge. At various times after accident eye was moderately red and painful. Other eye never affected at all. At time of excision—L. eye, large ciliary staphyloma at upper part, passing into a complete but much narrower one, which goes all round cornea. Lens transparent, and displaced towards largest part of staphyloma. No perception. No ophthalmoscopic examination made.	Chromic acid for a few days. *O. D.* very deeply cupped, but edges of cup not overhanging, probably indicating that the atrophy did not yet involve all the nerve fibres of the intra-ocular part of O. N. *Retina in situ. Hyaloid* somewhat tougher and more rigid than usual, but very easily separable from retina, and showing an abundance of round corpuscles. *Vitreous* in front tough and stringy; there and elsewhere contained albuminous coagulated particles, granular matter, and oil-globules. Lines and little patches of heaped-up pigment in *choroid* showed presence of old choroiditis.

TABLE III.—EYES LOST BY BLOWS, SCRATCHES, &c. (*continued*).

Name, Age. Date of Excision. Register No. &c.	Nature of Accident.	Time between Accident and Excision.	State of Injured Eye since accident and at time of Excision. State of other Eye.	Changes found in Excised Eye.
Matilda S., 40. Oct. 2, 1871. No. 95. Hutchinson.	R. eye struck by piece of wood. Doubtful whether it was wounded or not.	2 years.	Some sight remained for two or three months after the accident. The eye had been occasionally inflamed and painful, and about twelve months before excision it began to "grow out." The other eye had been often irritable and intolerant of light since accident to R. At date of excision—R. eye, large hemispherical staphyloma in position of cornea, probably following a large perforating ulcer the result of the blow.	Chromic acid about three weeks. *Lens* of normal size and shape, opaque from chromic acid. *Iris* adherent all over to staphyloma, and much thinned. The *vitreous* and the fluid in the large posterior chamber both coagulated from presence of albuminous or fibrinous effusion. The staphyloma was in some parts thicker, in others thinner, than normal cornea. There was deep cupping of the *O. D.*, accounting probably for complete loss of sight, and at back of eye the retina was separated over a large patch from the choroid by a layer of albuminous coagulated fluid $\frac{1}{20}$ inch (1·25 mm.) thick. No evidence of wound.
Louisa D., 32. Aug. 12, 1871. No. 72. Hulke.	L. eye struck by the handle of a saucepan.	8 years.	No trouble followed until three years after accident when eye inflamed spontaneously and vision was soon lost. Remained quiet again till two months before excision when it became inflamed, tender, and painful, and made R. eye irritable. This continued till excision, at which time L. was shrunken, very tender and showed some ciliary congestion.	Eye very small and much puckered. *Cornea* showed a horizontal band of opacity, corresponding to palpebral fissure, and studded with little granular bodies. *Lens* shrivelled and stony. *Iris* covered in front by thick false membrane, which also occluded pupil. *Retina* scarcely recognisable. A thin plate of bone within choroid surrounding O. D. Much cholestearine in position of retina and vitreous within the choroid.

Some reddish fluid, not, however, containing blood-corpuscles, between choroid and sclerotic. *Sections of cornea* taken through the band of opacities above mentioned showed at the seat of the opacities—1st, puckering of Bowman's membrane; 2nd, perforations in this membrane of a diameter equal to from six to twelve times its own thickness; through these passed finely wavy fibrous tissue, continuous on the one side with the superficial layers of the fibrous cornea and on the other spreading out far beyond the aperture in Bowman's membrane and gradually thinning out until no longer perceptible; 3rd, the epithelium was lifted off from Bowman's membrane by this eruption of organised fibrous tissue; it was, moreover scanty and irregular, although this may have been due to carelessness in making the sections, &c.; 4th, in various parts of cornea small collections of round or more or less spindle-shaped cells; these collections run chiefly parallel to corneal corpuscles; some of them have an appearance of being aggregated round a central channel (? blood-vessel), but no distinct evidence of blood-vessels was found. They occur in all parts of cornea, some being close to Descemet's membrane, but are more abundant beneath the band of roughened cornea than in the parts which showed no naked-eye change on surface. Bowman's membrane itself looked normal. Superficial layers of cornea did not show the corpuscles well; they were represented chiefly by fine lines.

TABLE III.—EYES LOST BY BLOWS, SCRATCHES, &c. (*continued*).

Name, Age, Date of Excision. Register No. &c.	Nature of Accident.	Time between Excision and Accident.	State of Injured Eye since accident and at time of Excision. State of other Eye.	Changes found in Excised Eye.
John S., 37. Aug. 22, 1871. No. 80. Critchett.	L. eye struck by fist; sight gradually failed. A second blow, 1½ year later, from a snow-ball. Quite blind.	12 years. 8 years.	Eye remained quiet till two weeks before excision, it then became suddenly very painful after he had been writing for some time. Pain went off in a short time but returned on similar use of the other eye a few days later, and the R. eye became weak and watery. Was always short-sighted, and on examination R. was found myopic about $\frac{1}{10}$; it is probable that the myopic state of the L. predisposed it to inflammatory changes. At time of excision L. eye had no perception; cornea was steamy, especially opposite palpebral fissure; T. +; globe very tender; ciliary and some conjunctival congestion. Pupil acted slightly; iris drawn backwards into funnel shape; a white floating body (lens) seen at lower part behind iris.	Globe not appreciably elongated. *Retina* detached in umbrella form as far as ora serrata, and shrunken. *Lens* calcareous, somewhat shrunken, loose at bottom of the much diminished vitreous chamber. *Choroid* extremely atrophied, only a few small patches retaining their pigment. At inner and lower part of ora serrata an arc of *partly ossified tissue* taking about one-fourth the circumference of the eye and continued backwards into a large plate of tough, fibrous (but not yet ossified) tissue on inner surface of choroid.
Joseph C., 70. Sept. 21,	L. eye struck by a chair.	20 years.	Some sight remained till about one year before excision, after which eye became blind. A short time before excision	The opaque *lens* escaped during excision. *Vitreous* yellowish, and somewhat firmer than normal. *Retina in situ*, and appeared

1871. No. 92. Hutchinson.		cornea ulcerated, and was deeply infiltrated with pus at date of operation. R. eye perfect.	healthy to naked eye, and in recent teazed-out specimens under microscope. *Lens-capsule* was adherent to iris in part, and contained a number of pus-like corpuscles: these may have been accidentally introduced from a. c. after escape of lens, or the result of proliferation of capsular cells. At upper and outer half of equator a large arc of old *choroiditis* occupying one-third of the circumference, composed of small round heaps of pigment single or collected into groups, and of some atrophic patches without pigment accumulation. None of the spots felt gritty as in so-called "colloid" disease. The *retina* was adherent to the pigment spots, and its structure tore rather than separate from them. Opened immediately after excision and examined fresh. In this specimen it is probable that the choroiditis was the result of the blow, but it is doubtful whether either the cataractous state of the lens, or the recent corneal disease were connected with the remote injury; there was however, no cataract in opposite eye and this is in favour of the cataract in left being secondary. He was questioned closely as to syphilis and no evidence could be obtained that he had ever had it; there seems therefore no reason to suspect that the choroiditis was due to syphilitic taint.

TABLE III.—EYES LOST BY BLOWS, SCRATCHES, &c. (*continued*).

Name, Age, Date of Excision. Register No. &c.	Nature of Accident.	Time between Excision and Accident.	State of Injured Eye since accident and at time of Excision. State of other Eye.	Changes found in Excised Eye.
Francis H., 56. Aug. 4, 1871. No. 68. Lawson.	L. cornea scratched by a piece of wire. (He believes wire penetrated the eye.)	18 days.	Seen eight days after accident; cornea infiltrated and sloughy; T. n. Next day paracentesis was done, but hypopyon increased and eye was excised a few days later. R. eye perfect.	*Lens* escaped through hole in cornea during excision. *Choroid* and *retina in situ*, appeared normal to naked eye, but choroidal epithelium stripped off more easily than usual and remained adherent to retina as seen in some cases of recent retinal œdema. *Vitreous* reddish and semi-opaque, containing granular matter (albuminous, probably) and small acicular crystals (blood crystals?).
George B., 30. Oct. 15, 1872. No. 256. Lawson.	R. eye injured by a bit of coal-dust.	5 weeks.	The eye had already been inflamed and "weak" from dust, &c., when in the army at the Cape of Good Hope. The bit of coal-dust was removed by a comrade but ulceration and perforation of cornea followed.	Eye burst during excision. Opened next day without preparation. Commencing inflammation of *vitreous*, most marked on ciliary body and in hyaloid fossa; strings consisting of fibrinous basis with a great many large round corpuscles. At hinder part vitreous almost clear and containing no corpuscles, but coagulating freely when heated showing albuminous infiltration. Hyaloid separates very easily from retina, owing to inflammation. *Lens* absent; its capsule present. *Retina* showed two considerable blood patches near equator, and

				there was slight swelling and haze of O. D. No good sections of O. D. made, though specimen was hardened on purpose. Sections of *choroid* near O. D. showed early stage of suppurative inflammation, thickening from abundant infiltration with inflammatory cells.
Thomas O., 41 Jan. 19, 1872. No. 138. Lawson.	R. cornea abraded by a piece of hard putty.	About 6 weeks.	Came to hospital a fortnight after accident with hypopyon-ulcer of R. cornea. Hot belladonna fomentation for ten days; then iridectomy. Operation followed by increase of hypopyon and sloughing of cornea. Never much pain. Patient a healthy house-painter and had often before got foreign bodies into his eyes without serious result. At date of excision—Other eye painful. Next day it was better and the sight good.	Immediately after excision T. —; *cornea* opaque and showing black spots of iris at seat of perforations. *Vitreous* for the most part opaque and stringy, but fluid at back of eye. It contained a considerable number of large inflammatory corpuscles. *Retina* and *choroid* looked normal to naked eye; not examined microscopically. *Lens* much rounder than normal, probably from imbibition of fluid. Chromic acid one month.
Henry S., 32. Oct. 2, 1872. No. 251. Couper.	L. eye pricked. Blow by finger-nail.	27 years. 4 years.	Ten years after first accident he had operation for "artificial pupil," but could never see well enough to read with injured eye afterwards. After second accident all sight was lost. Had some inflammation of same eye, which left a white speck, at æt. 5 years. Lately L. again became painful and R. irritable. At date of excision, L. eye a good deal shrunken, dense leucoma at upper and inner part of cornea, large artificial pupil upwards and outwards. Iris brown. R. eye improved after excision of L.	Examined at once. *Retina* detached in umbrella form, semi-opaque, folded and wrinkled in an unusual way, and containing a little fluid and stringy *vitreous*. *Subretinal fluid* clear, watery and nearly colourless. *Choroid in situ*, much atrophied in a ring which quite surrounded O. D. and was about half its width; from the ring a broad patch of atrophy extended outwards a little beyond Y. S. I did not ascertain whether other eye was myopic. *Lens* absent.

TABLE III.—EYES LOST BY BLOWS, SCRATCHES, &c. (*continued*).

Name, Age, Date of Excision. Register No. &c.	Nature of Accident.	Time between Accident and Excision.	State of Excised Eye since accident and at time of Excision. State of other Eye.	Changes found in Excised Eye.
James B., 18. Sept. 5, 1871. No. 84. Couper.	R. eye burnt by melted sawdering metal. A piece as large as a sixpence taken out directly afterwards.	1 month.	Three days after accident cornea was slightly hazy and conjunctiva extensively whitened. Afterwards cornea sloughed. At date of excision, eye was somewhat shrunken and very soft; sclerotic veins congested.	*Vitreous* normal to naked eye. *Retina* separated slightly from choroid in many little folds which radiated from neighbourhood of O. D. No apparent thickening of *retina* or *choroid*, and sections of the latter near Y. S. looked normal under microscope. *Between retina and choroid* thin layer (not present everywhere, and notably absent around O. D.) of white soft inflammatory matter, consisting of pus-like corpuscles and a smaller number of large corpuscles uniformly granular and slightly pigmented; both these were probably results of overgrowth and proliferation of choroidal epithelium. There were also very numerous ill-defined corpuscles, smaller than pus-cells, and of doubtful nature. *Lens* had burst its posterior capsule and some lens-matter was protruding into vitreous; this was not accidental, for the eye was opened transversely at equator. Chromic acid five days.

Joseph W., 24, a negro. Oct. 31, 1871. No. 106. Couper.	A drop of coal tar fell into his left eye.	6 years.	Sight of L. eye was lost in about one week after injury. After that the eye remained quiet till three weeks before excision, when it became painful and red. At time of excision eye somewhat shrunken, lens opaque. For three weeks R. had also been failing; on admission, iritis with slightly steamy cornea, great congestion and some pain; V. large letters. From the history it seemed most likely that he had had iritis before, and that the present attack was chiefly conjunctival rather than sympathetic. This borne out by marked improvement following use of astringents.	Large opacity near inner margin of *cornea*. *Iris* normal to naked eye. *Lens* somewhat shrunken but of good shape, opaque at centre and in a streak passing from centre towards posterior surface; opacity consisted of myeline globules and masses, laminated (probably amyloid) bodies, and a little cholestearine. *Ciliary body* at upper and inner part atrophied, the corresponding ciliary processes having shrunk away from margin of lens. On outer surface of this atrophied part a minute, firm, round, whitish body, close to one of the larger vessels, and also close to a nerve; looked like an encapsuled foreign body of very minute size. On teazing it was found to consist of tough fibrous tissue, apparently containing a small coil of the blood-vessel (? aneurismal dilatation). The O. D. and extraocular part of O. N. atrophied. *Retina* and *choroid* healthy to naked eye; no epithelial disturbances of choroid when magnified. Chromic acid five days.

TABLE III.—EYES LOST BY BLOWS, SCRATCHES, &c. (*continued*).

Name, Age, Date of Excision. Register No. &c.	Nature of Accident.	Time between Excision and Accident.	State of Injured Eye since Accident and at time of Excision. State of other Eye.	Changes found in Excised Eye.
Charlotte D., 15. Aug. 20, 1872. No. 234. Critchett.	L. eyelids injured in some way by a skipping-rope.	About 5—6 years.	The injury resulted in severe ectropion. Has had two or three operations at other hospitals during last five years, but does not know whether on the lids or the eye. She thinks the eye has been "growing out" for four years, and quite blind for about three years. At time of excision—L. cornea and ciliary region appear uniformly enlarged. Cornea universally opaque, but densest white at centre, where it appears thickened and shows a few rather large "sea-weed" vessels, which seem to emerge from or dip into *centre* and do not reach to corneal margin. The eye has never been painful. R. eye quite good; can see well at long distances, and is therefore not myopic, at least not in any important degree.	Eye much elongated, apparently by enlargement of anterior part of sclerotic and of cornea. Corneal curve uniform; circumference circular; diameter $\frac{7}{10}$ inch (18 mm.). Antero-posterior diameter of eye $1\frac{1}{8}$ inch (29 mm.). Horizontal diameter at equator $1\frac{1}{20}$ inch (26·5 mm.). Chromic acid (1 per cent.) for three months. Antero-posterior section. *O. D.* deeply cupped. *Retina* and *choroid* look normal to naked eye. *Vitreous* fluid but containing a large quantity of coagulated, soft material; the same in A. C. *Lens* represented by a thin disc, convex forwards, concave behind, attached by a considerably stretched suspensory ligament to ciliary processes, and by a tough pillar of fibrous tissue about $\frac{1}{10}$ inch long to back of centre of cornea; the pillar at its central and thinnest part was abort half as thick as a No. 1 eye-probe. *Iris* quite free from lens and no signs whatever of synechiæ; pupil round and rather large. Iris much wider than normal but too thin. Cornea considerably too thick at centre and too thin at circumference. Close examination shows that

the increase in size of front of eye has occurred chiefly by stretching (with some compensatory growth) of sclero-corneal junction, especially of its *corneal* part. The *ligamenti pect. iridis*, and iris with it, have been stretched forwards in the same proportion as the corneal circumference itself, while the ciliary attachment of the iris has remained unaltered in position. The part of iris between these attachments, remaining in close contact with the stretched and overgrown corneal circumference, has also elongated very much, the result being an immense posterior chamber coexisting with a deep anterior one. The *membrane* of *Descemet* had given way near its circumference over a large part and has curled forwards into a minute roll composed of two and a half or three close spiral turns; in other parts it had ruptured without curling up, while through the large apertures thus left new tissue had passed and spreading out, had covered large portions of the inner surface of Descemet's membrane, gradually thinning away until imperceptible. This new tissue closely resembled normal corneal connective tissue. Epithelium of Descemet's membrane represented by a thin line of finely granular matter in which no cells were distinguishable. *Cornea* contained numerous blood-vessels in its anterior layers extending about one-third through its thickness. Corneal nuclei very abundant, several in each corpuscle, and small; this change chiefly also in front layers. No trace of Bowman's membrane in any sections. Anterior epithelium normal.

PERFORATING ULCERATION OF CORNEA.

79. *Hypopyon Ulcer of Each Cornea at same time in a Young Man without known Cause—Excision of one Eye for Slough of Cornea.*

John L., 25, patient of Mr. Streatfeild, had his left eye excised on August 21, 1871. The lower half of the cornea had sloughed and there was great chemosis. During excision, most of the contents of the eye, including the retina, escaped; the *choroid and ciliary body* looked healthy to the naked eye. The eye had been inflamed for about three weeks before he came to the hospital. The other eye was also suffering from superficial ulceration of the cornea with large hypopyon. The patient was a farm-labourer, earning about ten shillings a week; he knew of no cause for his eye disease.

238. *Cornea burnt by Lime six weeks before Excision—Perforating Ulceration of Cornea—Large Effusion of Albuminous Fluid between Choroid and Sclerotic—Retina not Detached—Commencing Inflammation of Vitreous.*

John H., 58, had one eye burnt by lime five or six weeks before excision. A ditch ulcer formed almost all round the corneal margin, and a funnel-shaped one at the centre which after a time perforated. About a fortnight after excision there was a large hypopyon and the marginal ulcer; no increase of tension. The eye was excised Sept. 2, 1872, by Mr. Hutchinson. It was kept in Müller's fluid for two months and then opened. There was extensive detachment of choroid from sclerotic by coagulated gelatinous semi-opaque matter, in which no cells or blood-corpuscles existed. The detachment extended up to the attachment of the ciliary muscle in front, and to within about $\frac{1}{8}$ inch (3·12 mm.) from the optic disc behind. The *retina* was still in contact with the choroid. There was early inflammation of the *vitreous* shown in its being gelatinous, semi-opaque, and diffusely infiltrated with round corpuscles of various sizes and a few red blood-corpuscles. The *lens* looked somewhat too convex, probably from slight swelling. The *iris* was thickened, and the *ciliary muscle* slightly swollen and softened.

177. *Perforating Ulcer of Cornea after a Blow by a Twig—No obvious Disease at back of Eye.*

The left eye of John J., 30, an under gardener, apparently in excellent health, florid, spare, with nearly black hair. The left eye was struck by the twig of a tree two months before excision; perforating ulcer of the cornea followed, and all sight was lost in about a fortnight. The eye gave him much pain. During excision the cornea burst, and the lens, and greater part of the vitreous escaped. No further examination was made; what remained of the vitreous looked healthy, not suppurating.

226. *Eye Lost by perforating Ulcer of Cornea—Excision a few weeks after—Early stage of Inflammation of Vitreous—Effusion of fluid between Sclerotic and Choroid, with plait-like Detachments of Retina and thickening of the Choroid.*

Abel S., 2 years, had ulcers on each cornea about four months before excision of his left eye; it was not known when the left cornea gave way, but on admission, August 6, 1872, there was almost complete perforation with hernia of the posterior elastic lamina and iris, the rest of the cornea being semi-opaque. The ulcers had formed after he had been for several months in bad health, and about a fortnight before admission he was believed to have had chicken-pox. Mr. Bowman excised the eye the same day. Very soon after removal T was −. The eye was of good shape.

It was examined after treatment with Müller's fluid for two and a-half months. The *vitreous* was cloudy, and had partly lost its normal toughness from diffuse infiltration with albuminous fluid which had become gelatinised by the preservative; in front it was rather abnormally stringy. Its most central part contained a good many scattered well-formed red-blood discs which were also present in the anterior part. There were numerous inflammatory corpuscles, some large, round, or multipolar, and others like pus cells, on the hyaloid and in the anterior part of the vitreous; in the latter situation was also a number of slightly curved acicular crystals, and on the hyaloid, which separated very easily from the retina, many collections of hyaline (albuminous or colloid?) globules. There was slight separation of the *retina* in a few close folds, due to the detachment of the *choroid* from the

sclerotic by a thin layer of fluid. None of these reached nearer than ¼ inch (6·25 mm.) to the disc. The *choroid* itself was thickened. The *lens* looked healthy. There was a central anterior synechia at the position of the corneal perforation, the latter being filled by a button of granulation tissue. The anterior chamber contained translucent coagulated matter. No microscopic examination of any part was made.

165. *Perforating Ulceration of Cornea without known Cause in a young Patient, causing complete Corneal Staphyloma.*

The right eye of Sarah S., 14, removed by Mr. Streatfeild March 25, 1872. At the time of excision there was a large, rather irregular corneal staphyloma. The eye "inflamed" six months previously without known cause and was said to have been perfect before this attack. She had a good deal of very severe pain since the sight was lost and her health suffered in consequence, but the other eye was not affected.

In this eye (after hardening in chromic acid for seven months) the *vitreous* was found to be opaque, soft, and gelatinous, doubtless from albuminous effusion into it, indicating an early stage of inflammation. There were no naked-eye changes in the *choroid* or *retina*. The *cornea* was irregularly and considerably thinned, being everywhere of less than its normal thickness; its posterior surface was covered closely by the iris. There was no alteration of the *lens*, but its *suspensory ligament* was greatly elongated by bulging outwards of the ciliary region. No microscopical examination of any part.

55. *Perforating Ulcer of Cornea without Injury—Secondary Suppurative Inflammation of the Choroid, Retina, and Vitreous—Softening and rupture of Sclerotic.*

The right eye of Richard S., æt. 62, removed by Mr. Hutchinson July 3, 1871. Five months before excision the eye inflamed without apparent cause; sight was lost in about a month. When he came to the hospital the cornea had sloughed at its centre and the globe was suppurating. He refused excision for three weeks, after which interval the eye had begun to get less inflamed. Examined directly after excision it was found that the *sclerotic*,

softened by inflammation, had ruptured behind the insertion of the rectus internus, and a large ragged hole was the result. The *iris* protruded from the corneal aperture. The *lens* had escaped. There was recent advanced suppurative inflammation of *retina* and *vitreous*, and abundant infiltration of the *chorio-capillaris* with pus cells. The deeper layers of the choroid and the *sclerotic* were œdematous and contained finely granular matter, but no new corpuscles.

112. *Eye lost by Ulceration of Cornea from exposure in a case of Exophthalmic Goître—No special changes in the Eye—Small Congenital gap in Retina, near Ora Serrata.*

Mary Anne O., 20, a servant living near Clare, in Suffolk, was under Mr. Wordsworth's care in November, 1871, for total staphyloma of the right cornea; its surface was dry. The globe was much congested and painful, and conjunctiva œdematous. The eye had inflamed about six months before, and sight was rapidly lost. It was treated with "bluestone" at a hospital but without benefit. At the time of excision she had been suffering from Basedow's disease for about 16 months, the chief symptoms being marked exophthalmos, palpitation, nervousness, slight fulness of the thyroid gland, with excessive pulsation of the carotid arteries, and such branches (the temporals), as were examined. She had not been able to close her eyelids completely for some time before the right cornea became ulcerated, and when she came to the hospital the greatest effort at closure still left a chink from $\frac{1}{10}$ to $\frac{1}{8}$ inch wide (2·5 to 3·12 mm.) between the lids of the healthy eye. With the latter she could see perfectly, but it was becoming watery and painful.

The excised eye was examined after 10 days' hardening in chromic acid. Excepting the cornea, which was thickened in most parts and thinned at the centre, and the iris which was extensively adherent to the cornea, none of the ocular structures showed any naked-eye or microscopical changes. The arteries perforating the sclerotic at the back of the eye presented no evidences of change: their circular muscular coat was very well shown, but not excessive, and their calibre was not increased perceptibly.

A point of some interest was the existence of a slight gap in

the *retina*, doubtless congenital, at the ora serrata at the lower and inner part of the eye. In front it was about as wide as one serration and a half of the retinal free border, behind as wide as one serration, while its antero-posterior length was equal to its greatest breadth.

Perforating Ulcer of Cornea during Lactation—Staphyloma of Cornea—Pyramidal Cataract—Changes in the Lens.

Rosina A., æt. 39, lost her left eye about ten months before excision, by the occurrence of ulceration of the cornea followed by perforation. She was suckling when the eye inflamed. Mr. Couper excised the lost eye on September 5, 1871. There was a large opaque hemispherical staphyloma at the centre of the cornea, the normal cornea being present only in the form of a narrow zone encircling the base of the prominence. The eye was dissected after a week's treatment with chromic acid. All the parts behind the lens appeared to the naked eye healthy. The corneal staphyloma was very thick and quite opaque. Near to the centre of its inner surface was attached the anterior foot of a cord of opaque, white, tough tissue whose hinder end was joined to the anterior lens-capsule. The *iris* was spread on the posterior surface of the cornea, and was intimately adherent to it in the neighbourhood of the above-named fibrous cord. Perforation had in all probability occurred at the part into which the fibrous cord (pyramidal cataract) was inserted, and where also the iris was most adherent.

Microscopic examination of the *lens* and *anterior capsule* near to the lenticular end of the cord showed the capsule to be normal and lined by the usual single layer of flat cells with large single nuclei, but beneath these were several layers of inflammatory cells, round, slightly granular, and about as large as pus corpuscles. No examination was made of the foot of the pyramidal cataract itself, or of the lens-capsule immediately underlying it. The lens itself was shrivelled and showed many white specks at its margin consisting of spherical globules not dissolving in nitric acid, primarily connected with lens-fibres but often also aggregated into separate compound masses, probably myeloid globules. Lens-fibres otherwise healthy. Many opacities and thickenings of capsule, especially at junction of its anterior and posterior layers.

A much shrunken Eye lost $2\frac{1}{2}$ years before, probably by Corneal Ulceration.

The right eye of James B., 36, excised by Mr. Streatfeild April 25, 1872. It became blind gradually by "a cold" (in about six months) $2\frac{1}{2}$ years before excision, and had not been painful since. There was a large nebula on the cornea of the other eye. The excised eye was only as large as a bean, and squared. It contained no lens. The choroid and retina were fused into a fibrous mass, and there was no bone in the eye.

153. *Perforating Ulcer of Cornea and loss of Lens eight years—Eye shrunken—Retina detached—Colloid disease of Choroid.*

Abraham W., 16, lost the sight of his left eye by spontaneous inflammation at the age of eight years; he was much out of health at the time, having had bad sore throats but no definite illness. The eye was lost in about a week, no doubt by ulceration and perforation of cornea. Lately the right eye had been painful, its visual power was however good. The lost eye had not troubled him at all lately; it was excised by Mr. Wells February 23, 1872. The eye was much shrunken, the cornea flat and opaque. There was flask-shaped detachment of the *retina*. The *lens* was wanting. On the *choroid* were a great many "colloid" bodies of small size, and still covered by the epithelium; they were very abundant in front of the equator, much less so behind it. The whole choroid was well pigmented. The *sclerotic* was thick.

126. *Perforating Ulcer of Cornea followed by large Anterior Synechia and large Corneal Staphyloma—Iris torn from Ciliary Border in several places—Suspensory Ligament stretched and partly ruptured—Ciliary Body not displaced—Detachment of Hyaloid—Atrophy of Rods and Cones and commencing Pigmentation of Retina.*

The left eye of John H., æt. 14, under the care of Mr. Wells, excised December 29, 1871. He had something amiss with both eyes when quite young. Again five years before excision the left inflamed and was gradually lost "from a cold;" no history of injury. Condition at the time of excision: he asserts that with the left eye he had perception of light. There was a large

staphyloma of the cornea at the lower part, its apex being thin and ulcerated. The upper half of the cornea was clear and there it could be seen that the iris was separated from its ciliary attachment for a considerable distance. The tension was slightly diminished. There was ciliary congestion, and the eye had lately been somewhat painful. There was no defect of the other eye.

The left eye was hardened for a month in chromic acid and divided vertically from behind forwards. The *lens* was shrivelled and hard; its suspensory ligament was absent from a considerable part of the circle, and where present was much elongated. The most unusual change consisted in the separation of the *iris* at its ciliary border for about $\frac{1}{4}$ inch (6·25 mm.) at the upper and inner part, *i.e.*, at the part farthest from the seat of corneal perforation; the separated edge of this part of the iris was curved *backwards*, and was at a considerable distance from the cornea, its pupillary border and the whole lower part of the iris being spread out on the cornea. There was thus a wide communication between the sole remaining part of the anterior chamber and the posterior chamber, and through the ruptured suspensory ligament, with the vitreous. There was likewise detachment of the *hyaloid* from the retina, the anterior part of the space being filled with membranous curtains, the posterior part with clear fluid. There were many minute elevations on the *retina*, but no other naked-eye change. The *ciliary processes* were not in the least dragged forward and looked quite healthy.

Did the detachment of iris at its ciliary border in this case occur at the moment when perforation of the cornea took place, or was it gradually effected afterwards by further yielding of the corneal staphyloma and iris adherent to it? Probably the former was the true state of the case, for gradual stretching of the staphylomatous cornea would have been accompanied by equally gradual extension, and not by rupture, of the iris as is frequently seen in cases where a very prominent staphyloma forms gradually after the greater part of the cornea has sloughed.

Although this patient said that he could distinguish light from dark with the left eye, when carefully tested just before excision, microscopical examination showed that his statement was probably erroneous, for the rods and cones where looked for were absent, being represented by a thin irregular bed of yellowish

matter connecting the *limitans externa* of the retina with the choroidal epithelium. The vertical connective-tissue fibres were thickened and their nuclei very evident, but they had not coalesced into thick pillars; the granules of the outer layer were scanty, those that were present being somewhat enlarged; the other parts were normal, excepting that the nerve cells were not evident in all parts, and were occasionally shrunken and granular. There was atrophy of the *chorio-capillaris* and of the stellate pigment cells of the deeper parts of the choroid, but the large blood-vessels were distended. A few of the epithelial cells had passed a short distance into the retina. There was no colloid disease.

174. *Corneal Disease, probably ulceration, causing permanent opacity, followed after ten years by sudden loss of sight with inflammatory symptoms and shrinking of Eye—Detachment of Retina by inflammatory effusion—Œdematous thickening of Ciliary muscle—Colloid disease of Choroid.*

The left eye of Mary M., 18, excised by Mr. Wordsworth April 17, 1872. The eye was first bad when she was eight years old, and there had been "a skin over it" ever since then. Four years before excision some operation was done on it at Guy's Hospital and the sight much improved afterwards, but was still not good enough to enable her to read. She believed that it continued to improve till a few days before she came under Mr. Wordsworth's care, February 17, when it became suddenly inflamed and painful, and all sight was quickly lost. Various warm and cold local applications were used for two months and she was taken into the hospital for five weeks, but without benefit. The right eye was and always had been very good, and the patient herself looked remarkably healthy. The left eye continued painful up to the time of excision.

It was examined without hardening. It was considerably shrunken but of good shape. The *cornea* was diminished in proportion; it was roughened and showed patches of opacity, one of which was calcareous and effervesced with acid. The pupil was very wide, the iris being very narrow and in many parts adherent to the cornea. The *lens* was semi-opaque. There was detachment of the *retina* and obliteration of the vitreous chamber, the retina being folded and membranous. The *choroid* showed

on its inner surface a number of very small elevations (? "colloid" bodies) which were still uniformly covered by the epithelium; in the front part of the uveal tract the ciliary muscle was œdematous and soft, probably from inflammatory changes; it was not examined microscopically. The fluid between retina and choroid contained much albumen (nitric acid test), and was yellowish. It contained also a large quantity of white deposit quite separable from the clear fluid by settling, and made up entirely of granule corpuscles (degenerated inflammatory corpuscles) full of dark minute globules; many of the corpuscles were aggregated into little clumps. This deposit floated like cream when thrown into salt and water, and by treatment with ether was proved to be almost entirely oil.

98. *Perforating Ulcer of Cornea—Anterior Synechia—Dragging forwards of Ciliary Body—Partial absorption of Lens.*

The right eye of Mary R., 27, removed by Mr. Soelberg Wells October 10, 1871. Both eyes had been damaged by perforating ulcers of the cornea after measles many years before. At time of excision the right eye was shrunken, very soft, and congested in the ciliary region. There was a vascular scar on the upper part of the cornea. It had been in this state more or less for about three months. In the left eye there was a symmetrical staphylomatous scar on the upper part of the cornea.

Hardened in chromic acid. The *vitreous* became opaque, and was probably therefore albuminous. The *lens* was much wasted, only its peripheral parts remaining. The most important alteration was in the *ciliary body and iris*, which were much dragged forwards towards the old corneal perforation to which the iris was closely adherent.

131. *Eye excised 40 years after being lost by Corneal Disease (probably severe ulceration, perhaps perforation)—Evidence of former Neuritis—Effusion between Choroid and Retina (probably recent)—Chronic Cyclitis and Hyalitis.*

Hannah H., a single woman of 48, had some inflammation of both eyes when about eight years old; the left got well, but the right gradually became quite blind. Since then it had been occasionally painful, and after several weeks of pain she came, at

her friend's advice, to the hospital on January 4, 1872, when Mr. Critchett excised it. The cornea was densely opaque and irregular. The left eye was somewhat irritable, but otherwise appeared healthy in a superficial examination. There were no signs of hereditary syphilis in her teeth or physiognomy.

The excised eyeball was slightly enlarged in some directions. After one month's hardening in chromic acid its greatest antero-posterior diameter was $\frac{16}{15}$ inch (26·66 mm.), the equatorial diameters taken transversely and vertically being almost exactly 1 inch (25 mm.), whilst the diameter starting at the equator midway between the superior and external recti and crossing to the opposite point measured $\frac{16}{15}$ inch (26·66 mm.). The *old* changes found on dissection were advanced atrophy of the *optic disc*, with a shelving cup due to almost complete atrophy of the nerve-fibres; great thickening of the *hyaloid* membrane where it covered the ciliary body, with a scanty sprinkling in it of round cells rather larger than pus; fluidity of the *vitreous* behind, and a tough stringy condition with a few scattered corpuscles in front; a good many processes of considerable (microscopic) size projecting into the ciliary retina from the *ciliary body;* these probably inclosed small blood-vessels, and one undoubted vessel was seen in the same situation uncovered by pigment; there were also some minute round pedunculated growths, apparently composed of more or less altered cells and perhaps containing blood-vessels, in the same situation. The *iris* was adherent everywhere to the cornea, and the lens much too convex and rounded, was pushed forwards against the iris. There were also two or three spots of old *choroidal disease* with pigment heaping in the lower part near the ora serrata; but there was no pigmentation of retina, a fact doubtless ascribable to the very slight implication of the choroid at an early stage. The only *recent* morbid change was the existence of a thin layer of white flocculent substance between choroid and retina, slightly lifting up the latter membrane in the lower half of the eye. It was in large patches, and consisted of structureless granular matter enclosing numerous round spherical clear cell-like bodies with thin outlines resembling in refraction and size swollen red-blood corpuscles, but quite colourless. A few of them were provided with processes and were granular. They lay in a finely granular substance. They were not like any cells

derived from choroidal epithelium, and moreover the latter showed no signs of proliferation. I am inclined to think that they were of retinal origin, possibly altered rods and cones, more especially as the elements of the bacillary layer showed in most cases similar globular terminal clubs though of smaller size. The *rods and cones* in the neighbourhood of the disc were often somewhat elongated, distorted, and the bulbous parts of the cones irregularly swollen. It is most likely that the terminal swelling of the rods and cones was in part caused by the action of chromic acid, but the existence of the subretinal effusion, and the elongation of the bacillary structures must have been due to recent disease. In many sections of *retina* the rods and cones were absent from considerable tracts or represented by a few scattered ones; this may have been accidental. In all sections the nerve-fibres and nerve-cells were highly atrophied, but the other retinal structures presented no obvious changes except near the yellow spot where the rod- and cone-plexus was somewhat wasted. The *hyaloid* everywhere on the retina was thickened, hyaline, and contained corpuscles. There was atrophy of the *chorio-capillaris* and to a less extent of the deeper part of the choroid, and this was especially advanced at the rim of the optic disc where a narrow zone of choroid of unequal width was reduced to a thin fibrous layer to which the outer limiting membrane of the retina was adherent. The retina at this part was much wasted in all its layers. The *choroidal epithelium* was tolerably normal, presenting only slight enlargement and deficient pigmentation of a few scattered cells, except near to the disc, where it was absent altogether from the temporal side of the atrophic choroidal ring, and slightly heaped up from proliferation and overgrowth of its cells just at the nasal edge of the disc. The atrophic zone of choroid was widest on the yellow-spot side of the disc, and was there about one-fourth the width of the disc.

53. *Extensive formation of Bone on inner surface of Choroid in an Eye lost for many years by Corneal Disease—Recent slight Inflammation.*

The right eye of Mary Anne A., 32, unmarried, excised by Mr. Lawson July 4, 1871. The eye was lost gradually in childhood, and was she believes quite blind at æt. four years. It gave

no trouble till nine months before excision, when she had some pain and redness in it and similar attacks occurred several times afterwards. The other also became at times irritable and blood-shot. The patient was a pale woman with flabby skin, but seemed in fair health. At date of excision her right eye was tender when pressed through the lid, and slightly painful without pressure; T ? −. The cornea was semi-opaque everywhere, with a belt of denser opacities opposite the palpebral fissure. The anterior chamber was shallow. It was examined directly after excision. The *lens* was superficially calcified. There was much *bone* on the inner surface of the uveal tract, forming a shallow cup around the o. n., with outlying islands at the equator, and a zone of the same covering the hinder part of the ciliary body, but not reaching quite to the tips of the ciliary processes; a narrow belt of unossified fibrous tissue intervened between the inner (or front) edge of this bony zone and the outer edge of the lens. There was a remarkable arrangement of the *choroidal pigment* (probably epithelial) into rings and meshes, the islands enclosed by them being devoid of pigment and very thin. It was noticed that where the formation of bone was progressing, the new spicules lay over the densely pigmented lines, and not on the pale islands of atrophied choroid. There was detachment and shrinking of *retina* with advanced fatty degeneration of its tissue, whilst in the remains of the *vitreous* was much cholestearine and abundant oil of globules (microscopical examination). The *iris* was atrophied, but not abnormally adherent anywhere.

Ophthalmia Neonatorum and Diphtheritic Ophthalmia.

180. *Staphyloma of Cornea and posterior elongation of Eye, total Anterior Synechia, loss of Lens, fluid Effusion between Sclerotic, Choroid, Retina and Hyaloid; Chronic Inflammation of Hyaloid in an early stage; after Ophthalmia Neonatorum.*

Wm. P., 6 months, had purulent ophthalmia when a few days old. On April 29, 1872, he was brought to Mr. Streatfeild on account of his left eye, in which there was a prominent central corneal staphyloma, the iris being everywhere in contact with the cornea. Mr. Streatfeild excised the eye as useless and probably painful. Besides the anterior staphyloma, the eyeball was

elongated by posterior bulging. It was placed in Müller's solution for six months, but even then the sclerotic was not well hardened. It was divided transversely at the equator. There was no lens. The most important change, and probably a recent one, was the effusion of fluid between each of the coats of the eye, a thin uniform layer of it existing between sclerotic and choroid and between choroid and retina, and a large quantity between retina and hyaloid separating the latter considerably and quite up to the ora serrata. The choroid, from its elasticity, retained its proper spherical form, but the retina, being inelastic, had become accommodated to the diminished size of the interior by the formation of numerous little folds projecting inwards and radiating from the optic disc in which neighbourhood they were most abundant. The subhyaloid fluid was clear but contained soft probably albuminous flocculi, and a few scattered blood-discs. The *hyaloid* itself was thickly strewn with large corpuscles and nests of smaller ones. The former were either round or multipolar. The nests were about as large as adipose-tissue cells and contained corpuscles about as large as pus cells the central cells of each nest being round while the peripheral ones were more or less flattened concentrically, the nests thus having a slightly laminated structure. All the changes in the hyaloid pointed to a comparatively slow inflammatory process, not a pus-forming process.

103. *Staphyloma of Cornea after Ophthalmia Neonatorum—Lens Shrunken—Other parts normal.*

Thomas C., 10 months. Mr. Streatfeild's patient. Had ophthalmia neonatorum when a few days old. At time of excision the right cornea was uniformly and densely leucomatous, but not totally opaque. The globe was enlarged in all directions, so that the outer canthus had to be slit up to allow the globe to be extracted.

Hardened for one week, and divided in the antero-posterior direction. There was much shrinking of the *lens*. The *iris* was spread out on the back of the cornea, but not intimately adherent to it. The *cornea* was a good deal thickened, especially at the middle. There was no disease of *vitreous* or *choroid* perceptible to the naked eye, and the *retina* was also healthy to naked eye, and in thin sections under the microscope.

179. *Perforation of Cornea, escape of Lens, and total Anterior Synechia after Ophthalmia Neonatorum.*

Martin M., 5 months; Mr. Streatfeild's patient. His left eye was excised April 29, 1872. It was considerably shrunken and the cornea staphylomatous. A cursory examination of the perfectly fresh specimen showed total anterior synechia and absence of the lens. The vitreous was clear and of normal consistence; the retina was very slightly hazy. There were no other signs of disease to the naked eye. The child had suffered from ophthalmia neonatorum.

237. *Great elongation of Eye by posterior and anterior Staphyloma after perforation of Cornea from Ophthalmia Neonatorum —Glaucomatous excavation of Disc.*

The left eye of James W., 2 years old, removed by Mr. Wordsworth August 31, 1872. Both eyes were affected with purulent ophthalmia when the child was a few days old; the right recovered, but the left was lost and his mother thinks it began to "grow out" at about 12 months of age. It had probably given him some pain lately, for he had been noticed to rub it often. Before excision T +. General anterior scleral staphyloma and staphyloma of cornea; the latter presenting in addition to general bulging an especially large white prominence to one side of the centre with sea-weed vessels and nearly dry surface. After excision the hinder part of the eye also appeared much elongated, especially in the y. s. region, as in myopia. After being for three months and a-half in Müller's fluid it was opened horizontally from before backwards. The *sclerotic* was much thinned everywhere and pretty uniformly so; there was not much alteration in the naked-eye appearances of the *retina* and *choroid*, excepting the presence of a deep *glaucomatous cup* of the disc and some thinning of the neighbouring retina. The cup was shelving on the nasal and overhanging on the y. s. side, a fact probably caused by the backward pressure acting on it obliquely. There was no *lens;* its capsule together probably with the suspensory ligament and some new tissue was drawn forwards and to one side, to be attached by a short, thick fibrous cord to the most prominent part of the corneal staphyloma. The

iris was of course spread out on the back of the *cornea:* the latter structure was very thick at its central prominent part. The greatest peculiarity was the entire detachment of the *hyaloid* from the retina as far as the ora serrata in the form of a beautiful semi-transparent membrane still almost large enough to fit on to the retina; it was, however, folded forwards when seen. From the ora serrata another similar membrane extended across the eye, forming a septum placed just behind the lens-capsule; this membrane was doubtless in part a new formation, and the posterior part of the hyaloid was also thickened. The subhyaloid space and the cavities at the front of the eye contained soft gelatinous semi-opaque matter, with some clear fluid; there were no cells in this substance, only dim molecular structure.

225. *Perforating Ulcer of Cornea and total Anterior Synechia, followed by Ciliary Staphyloma, general enlargement of the Eye and excavation of the Optic Disc—At a later period effusion between elastic Lamina and Epithelium of Choroid (the Epithelium remaining adherent to the Retina), causing blister-like detachments of Retina.*

The left eye of Eliza B., 10 years old, excised by Mr. Streatfeild August 3, 1872. The eye had first been inflamed at the age of nine days, but no more detailed history could be obtained. At the date of excision a large ciliary staphyloma occupied the upper, outer and lower quadrants of the circumference; there was a large puckered scar at the lower and inner part of the cornea to which the iris adhered, being also in close contact with the rest of the cornea. The eye looked enlarged; there was no perception of light, T + 2, and occasional pain. The other eye was perfect, except $\frac{1}{20}$ of hypermetropia.

The globe was decidedly enlarged. It was opened after having been in Müller's fluid for $2\frac{1}{2}$ months; the tension was then —, and the sclerotic not well hardened. The greater part of the *vitreous* was fluid, except a small part in front which seemed about normal in consistence. *Lens* absent, its *capsule* thickened into an opaque disc near the corneal opacity. At the opacity the *cornea* was very thick, its remainder being of normal thickness; its hinder surface was covered everywhere by frayed out *iris* and bridges of black iritic tissue stretched across arcs of

cornea from circumference towards centre; there was no perceptible dragging forwards of the *ciliary body*. The *retina* was curiously detached in many blister-like patches of considerable area but small depth; there were none of the plaitings so commonly seen in early detachment by fluid effusion. On removing the retina all the choroidal epithelium came off with it, so that the effusion must have been beneath the epithelium, instead of between it and the bacillary layer of the retina. There was no pigmentation of the retina visible to the naked eye, and no disease of *choroid* similarly discoverable. The *optic disc* was very deeply cupped.

235. *Eye lost by Purulent Ophthalmia in infancy* 37 *years ago, and so shrunken as to allow Artificial Eye to be worn for last* 15 *years—Recent pain probably from commencement of bone-formation between Choroid and Retina.*

The left eye of Mary H., 37, removed by Mr. Hutchinson August 22, 1872. It was lost and the right much damaged by ophthalmia neonatorum, but remained so quiet that for 15 years before excision she wore a glass eye without any material trouble. Twelve years before removal, Mr. Dixon saw her and advised excision of the shrunken eye. She came on the present occasion because, for about two months past, the lost eye had been subject to attacks of pain sometimes extending all over the head and very severe. These symptoms had been accompanied by aching in the other eye.

On examining the eye after excision, a *plate of bone* was found on the inner surface of the choroid surrounding the optic disc and occupying about $\frac{1}{3}$ of the curve of the globe. In the *ciliary region* there was a quantity of pinkish brown succulent tissue between sclerotic and choroid; microscopically, it consisted of wavy fibres with distinct outlines (examined in water). The *retina* was of course a mere mass of soft brownish tissue, and there was no trace of *lens*. The eye altogether was no larger than a small cherry. Probably the plate of bone was the cause of the painful symptoms, for its small size was probably an indication of recent formation.

77. *Ulceration ending in perforation of both Corneæ in connexion with a severe illness at six months old—Diphtheritic inflammation? Perforating ulceration of cornea?—Excision of one eye two years later for Staphyloma of Cornea.*

Mary L., æt. $2\frac{1}{2}$ years, under the care of Mr. Critchett, had her left eye excised on August 18, 1871. The cornea was converted into a prominent hemispherical pinkish-white staphyloma, the surface of which soon became dry on exposure, and was in fact more like cuticle than mucous membrane. On examination no naked-eye signs of disease were found farther back than the *lens*, which was shrivelled; the *cornea* was much thickened, and the *iris* of course spread out on its posterior surface. The other eye was also almost fluid from universal opalescence of cornea; the child could tell light from dark with this eye.

The history was not, as was expected, one of ophthalmia neonatorum, for the child's eyes had remained quite well until she was about six months old. She had very bad health between two and six months of age, and at the latter age was expected to die. The eyes had been closed for a couple of weeks or so, and when opened one day, the mother noticed a " skin like a piece of bladder over them." The child recovered, but remained practically blind. There was never, the mother said, any considerable swelling of the lids. No scarlet fever or diphtheria had occurred in the house. There was no evidence of inherited syphilis in the patient nor history of symptoms in the elder child of the same family. In the absence of definite history of the child's disease, the nature of its eye affection must remain doubtful; severe ulceration of cornea from mal-nutrition would account well enough for the symptoms and pathological changes.

Acquired Syphilis.

152. *Plastic Inflammation of Retina and Vitreous after (? caused by) perforating Ulcer of Cornea—Those structures converted into a Fleshy Mass—Inflammation and thickening of Choroid, especially just around the Optic Disc—Patient had Syphilis many years before, and has borne Syphilitic Children.*

Mrs. P., 49, Mr. Couper's patient, had good sight till the summer of 1871. Her left eye then inflamed and was soon blind.

It continued painful till the date of excision, February 19, 1872, at which time the eye was shrunken, the cornea puckered, and a large ragged perforating ulcer seen at one part of its edge. There was a history of a short attack of "inflammation" in the same eye many years before, but the other eye had never ailed anything.

The specimen was examined roughly at once and then hardened in Müller's fluid. The eye was filled completely by a firm fleshy whitish-pink mass which represented the *retina* detached, folded up and fused into one with the inflamed *vitreous*, both together forming a mass which was in loose contact with the choroid and was attached behind to the optic disc. When hardened the retina could be traced imperfectly by some ill-defined convoluted lines diverging slightly from behind forwards, but could not be separated from the vitreous anywhere. On the outer surface at the hinder part was a thin layer of soft separable substance, probably fibrinous effusion. There was also marked thickening of the *choroid* in all parts, but especially just around the optic disc, where it formed quite a projection into the eye closely resembling in form a swollen optic disc. On one side in front of the equator the choroid could be readily separated into two layers which proved on microscopical examination to be due to the separation of the ciliary muscle and choroid proper from the *lamina fusca*, which was so thickened by inflammation as to constitute a distinct structure at that part. The thickening of the choroid both at the fundus and in the ciliary region was caused by the abundant formation of granulation tissue chiefly in the round-celled stage, the choroid where not extremely thick being infiltrated with lymphoid cells; these also occurred in groups in the interstices of the sclerotic, and were scattered profusely through the tissue of the optic nerve. The fibre-cells of the *ciliary muscle* did not appear to be altered, although they were, so to speak, dissected from each other by numerous round corpuscles and albuminous fluid.

Mrs. P. had secondary syphilis (rash and sore mouth) three months after her first marriage; this was followed by six miscarriages, and then came her only live-born child, a girl at present 18 years old who had been under Mr. Critchett's care for "cataracts" and "disease at the back of the eyes" the mother said. I afterwards saw this girl and she presented in all respects

a typical example of hereditary syphilis; prominent frontal eminences with transverse groove above eyebrows, depressed bridge of nose, small notched and peggy teeth, and old kerato-iritis with probably occluded pupils. She said she had "cataract taken off" the left eye many years before, and the anterior chamber was very deep when I saw her. Neither fundus could be illuminated. Her sight began to fail at the age of three years.

I do not know whether the conditions present in Mrs. P.'s excised eye were due directly or indirectly to her syphilis, but they were certainly different from any that have come under my notice as the result simply of perforating corneal ulcer. The only specimen in which the choroid and retina at all resembled this one was in a case related by Mr. Cowell at p. 337 of this volume. In that case there was some suspicion of syphilis (hereditary, however, not acquired as here), but the history of failure was very different from Mrs. P.'s, and there was no corneal disease.

I examined her other eye ophthalmoscopically nearly a year later very carefully, and could find no evidence of any disease.

171. *Chronic Irido-cyclitis and peripheral Choroiditis—Secondary Cataract and detachment of Retina—Chronic inflammation of Intra-capsular Cells of Lens—Epithelial changes on front of Cornea—Myopia and commencing Senile Cataract in other Eye—Patient probably remotely Syphilitic—No Arthritic History.*

Anne P., 60, Mr. Hutchinson's patient, came under care in July, 1871, for double cataract; the cataract was more advanced in the left eye and there were iritic adhesions in the same. She considered the left eye to have been failing for about $2\frac{1}{2}$ years gradually. There had been occasional shooting pain in the eye, but no attacks of inflammation. There was no history of arthritic complaints in her family, nor was she herself rheumatic or gouty. She came again in February, 1872, and attended till April.

During the last week of her attendance, the left eye was very painful and she also had a good deal of pain in the right. The condition of the left at this time was as follows: T. +; pupil round, small and probably excluded; iris slightly bulged for-

wards; cataract white and incomplete; a transverse band of superficial roughness of cornea corresponding to palpebral fissure. Excised the same day, April 12.

At that time with right eye she could see 19 when held close; this eye gave myopic refraction at a distance of about 2 feet.

As bearing on the possible cause of the iritis, &c., the following suspicious history as to syphilis is worth recording. The patient has had pityriasis palmaris with fissures on her right hand for 15 years and some eczema on the fingers; there is also slight pityriasis on the left hand. There is no history of secondary disease, and the patient is not aware that she ever had disease from her husbands (married twice). She has had in all four children, the first, by first husband, born at seven months, a boy, died immediately. Her first husband died a few months after marriage and there was then an interval of six years, after which she married again. Her second child, a boy, died at six weeks, but without history of syphilitic symptoms; was a fine child. The next child is living, and reported healthy, æt. 20. The fourth died of "scarlet fever," at three years.

The eye was examined after being hardened for a month in Müller's fluid. The *retina* was detached very extensively, the separation extending far beyond the ora serrata, almost to the ciliary processes in most parts. At the lower and outer part however the retina was still adherent for a short distance behind the ora serrata, and the *choroid* around this patch showed many spots of past inflammation. The opposite surfaces of the retina were pressed together and there was no vitreous. There was a layer of tough greyish tissue upon the hinder part of the *ciliary body* forming a narrow and nearly complete zone. It varied in width a good deal but nowhere exceeded half the breadth (antero-posterior dimension) of the ciliary body. The subretinal space contained clear fluid which, although the eye had been a month in Müller's fluid, gave a copious precipitate on boiling. In the lower part of the anterior chamber there was firmly coagulated translucent material, quite structureless and containing a few very long, highly refracting, probably crystalline bodies, comparable in length, breadth, and gradual tapering at one end to very fine hairs. There was no microscopic change in the *lens*, save that it was blackened by the preservative fluid, as often happens; but microscopical examination proved the existence of

abundant proliferation of the sub-capsular cells all along the front of the lens, while at the equator instead of multiplying they had enormously enlarged so as to simulate in size and form the oval cells of adipose tissue. Beneath the cell layer was an abundantly nucleated stratum having a fibrous appearance and most likely composed of lens-fibres whose growth had been started and development checked by the same inflammatory process which caused proliferation of the intracapsular cells. Beneath this was a somewhat broken layer of large oil or myeline globules and the fibre nuclei of this part were more or less enlarged or contained in dilated cavities. To the central part of the *anterior capsule* many pigment cells and pale lymphoid cells from the iris adhered and it was puckered in some parts. The *iris* looked healthy to the naked eye. The epithelium on the front of the *cornea* was of very irregular thickness, its superficial (squamous) cells being absent almost everywhere except at the margins, while the deep stratum of columnar cells was overgrown in an irregular manner, its individual cells being generally elongated and often much changed in form, club-shaped, pointed, dividing into several processes, &c. There was no change in the anterior or posterior elastic lamina and the posterior epithelium was perfect. The superficial layers of the proper corneal tissue were very finely granular and slightly dim in consequence, contrasting in this respect with the perfectly clear condition of the deeper part, but there were no cell changes.

Inherited Syphilis.

206. *Plastic Iritis travelling backwards to Ciliary body and choroid, and producing thickening of all these structures, greatest in Iris, least in posterior part of the Choroid—Similar inflammation of Vitreous, Retina and Lens—The change of Vitreous, chiefly in its central part, in course of Hyaloid Artery —Retinal Disease least marked at Yellow Spot region—Commencing elongation of rods and cones at many places—Patient probably subject of Inherited Syphilis and aged about 2 years.*

Margaret E. Zapp, æt. $2\frac{1}{4}$ years, was brought to Mr. Hutchinson at Moorfields on April 15, 1872, for iritis of her left eye with some inflammation of the cornea. The mother said that the eye had begun to inflame about three weeks before, having

previously been, so far as she knew, quite well; the other eye had never been affected. One-grain doses of iodide of potassium thrice daily were ordered and atropine drops to the eye. At the end of three weeks, there being no material change, grain doses of mercury and chalk were prescribed once a day, the iodide being continued. The iritis still advanced and there was some bulging in the ciliary region a few weeks after admission. There was never any considerable photophobia. On June 13th (two months after admission), the following note was made:—"Iris very vascular and bulged forwards, considerable congestion of globe, lids somewhat red probably from her rubbing them." It was excised the same day.

Previous History.—Particular inquiry was made with the purpose of finding out whether the child was the subject of inherited syphilis, with the result of establishing a strong suspicion, but no conclusive proof. The mother had been pregnant five times; the first (female), now aged 8 years, was said to have had no symptoms of syphilis in infancy; I afterwards saw her and there was nothing except slight and doubtful puckering at the corners of her mouth to warrant the least suspicion of syphilis. The second and third were miscarriages. The fourth (male) died at six weeks old; it had snuffles and thrush, but no rash on the skin; it was very thin. The fifth was the patient; she had snuffles soon after birth, and a slight eruption "like the measles" (perhaps only infantile lichen) about the buttocks and on the body at about three months old, but had no thrush; her health had always appeared very good. From this history it would seem not unlikely that the four later children were syphilitic, while the first was free from taint, a fact often accounted for by the father getting the disease after marriage. In this case however there was no history of syphilitic symptoms in the father, nor had the mother to her knowledge had any primary disease from him, and she gave no history of secondary or tertiary symptoms. The father was stated to have been a very steady man, and to have lately died of "consumption" at the age of 36.

The left eye was excised June 13, 1872. The cornea was then clear; the iris was swollen and showed numerous very large and tortuous veins. It was examined after being in Müller's fluid for four months; the *sclerotic* was then moderately firm. The *vitreous* was converted into a semi-opaque soft solid, having

much the consistence of jelly; in the centre there was a much firmer part which extended as a cord from the optic disc forwards and expanding into a funnel shape was attached in front at the ora serrata. There was moderate diffuse infiltration of the vitreous with round and multipolar cells; at the central cord these became much more abundant and many were more or less spindle-shaped, the cord itself being composed of beautifully developed spindle cells each with a large nucleus, except where it joined the retina and here the cells were round, or roundly oval, separated by a little highly refracting intercellular substance which remained as a network when the cells were removed; they were continued into the physiological cup and for some distance along the hyaloid on each side of the disc; no vessels entered the new vitreous tissue. The hyaloid also exhibited inflammatory corpuscles and patches of hyaline (probably albuminous) globules. The *retina* was dappled over on its inner surface with very numerous little elevations. At the equator, and for a short distance in front and behind it there were slight folded detachments; all the rest of the retina was *in situ*. The nerve-fibre layer was thickly infiltrated with round corpuscles, like those forming the hinder end of the central cord in the vitreous; indeed the limitans interna could not be made out in many sections the cells near the disc lying both in and upon the retina. There was general thickening of the retina from œdema and oval spaces existed in the intergranular layer. The bacillary layer was normal in some parts, in others its elements were slightly elongated, their inner (retinal) ends being thinned and apparently drawn out. In other parts again the rods and cones were converted into a layer of hyaline globules and granules having no resemblance whatever to the normal structures. The *choroidal epithelium* was in contact with the rods and cones in some sections; in others these structures were separated by a layer of perfectly clear gelatinised fluid, sometimes almost as thick as the retina and containing sometimes numerous oval disc-shaped spaces. As a rule all the above changes were least advanced near the disc and especially on its yellow spot side; indeed, near the latter the rods and cones were healthy. Changes resembling those in the retina were present in the *choroid*, viz., a moderate œdema and scattered infiltration of all its parts with round corpuscles pretty evenly distributed through all parts. The

elastic lamina was normal. The nuclei of the normal spindle-cells of the choroid were all somewhat enlarged. There was but very little pigment in the choroidal stroma. The front part of the uveal tract (*ciliary processes and iris*) were enormously thickened by new round- and oval-celled tissue which, in the case of the ciliary processes, had passed through the pigmented epithelium at various points and converted the *suspensory ligament*, *ciliary retina*, and *hyaloid* into a thick mass of inflamed tissue swollen by hyaline gelatinised fluid. New blood-vessels were present in this tissue close to the lens and rather behind its equator. The inner (pupillary) part of the iris was in close contact with the *lens-capsule*, in other parts a space of irregular but very small depth intervened. The *capsule* was thickened and puckered at the equator and posterior surface of lens, elsewhere normal; it showed no apertures. Within the anterior capsule was a layer of imperfect connective tissue several times as thick as the capsule with spindle-shaped nuclei, and intervening between this and the *lense-fibres* was a thinner layer of roundish, small, heaped-up cells, probably proliferated intracapsular epithelium. At the equator the intracapsular cells at one side of the lens were much enlarged into egg-shaped and round, highly refracting, nucleated bodies, and these extended for some little distance behind the equator. There were no striking changes in the lens-fibres except enlargement of the nuclei of some among the superficial ones. On that side of the lens where the swelling of intracapsular cells had occurred, a layer of coagulated fluid separated the capsule from the cells. The *corneal tissue* showed slight evidence of proliferation (or at least multiplication) of the nuclei of the corpuscles close to Descemet's membrane, and the *posterior epithelium* was everywhere very distinct and in some parts proliferated; the other parts of the cornea were normal. The front of the iris adhered to the cornea at one spot by a thick pillar of fibrous tissue containing corpuscles; elsewhere there was more or less anterior chamber filled with gelatinised fluid, which contained round or amœboid-looking corpuscles.

99. *Destructive Inflammation of the whole Uveal Tract and Retina in association with Interstitial Keratitis—Keratitis of the opposite Eye—Slight evidences of Inherited Syphilis in the Teeth and Physiognomy.*

The right eye of Peter M., æt. 18, excised by Mr. Couper October 18, 1871. The patient was suffering at the time of excision from very severe interstitial keratitis of both eyes. The cornea of the right eye was very opaque and the eye soft; he was unable to perceive light with it. The left cornea was also densely opaque at its centre and bulging; the eye was not congested. He stated that the left eye had first inflamed seven months before, and that the right became similarly affected about a month earlier. He had much treatment at Hull where he lived, and stated that among other measures scarification of the eyes had been used. There was no evidence in the state of his eyes or in his history that the case had been one of ulceration or of pannus, whereas the condition of his cornæ was just that which is seen in some cases of long-standing syphilitic keratitis. On examining his incisor teeth however nothing *conclusive* of inherited syphilis was found, although they were suspicious; the upper central incisors although of good shape were small, and the lower ones peggy. There was slight puckering of the skin at the corners of the mouth and his complexion had the pallor often seen in the subjects of hereditary syphilis; but still neither of these features was sufficiently pronounced to make the diagnosis certain.

After excision the eye was shrunken and squared and a groove ran round the sclerotic at the equator. Hardened for nearly two months in chromic acid and then divided nearly vertically in the anterio-posterior direction. No changes were found in the eye characteristic of syphilis, for the degeneration had gone too far. There was very extensive *detachment of retina* from choroid and of *choroid from sclerotic* with intervening effusions of fibrinous and granular matter, together with several recent blood-clots. The choroidal detachment began a little behind the equator and extended forwards to the ligamentum pectinatum iridis, and was much deeper just behind the lens than elsewhere. The *lens* was shrunken and quite loose in its capsule. The *iris* was in

contact with the cornea in one part; elsewhere the anterior chamber contained coagulated matter.

Family History.—The patient is the youngest of three children. The two elder ones (a brother and a sister) were reported as quite free from symptoms of hereditary syphilis. His mother had been married only once. The patient had never had nodes or ulcerations of the skin and he was not deaf.

Inflammation of Eye following Small-pox, Scarlet Fever and Measles.

233. *Eye much damaged by Small-pox Ulcer of Cornea ten months before excision—Recent Inflammation—Inflammatory œdema causing slight separation of Choroid from Sclerotic and compensatory plaiting of Retina—Vitreous in early stage of inflammation—Peculiar changes in Rods and Cones.*

Frederick S., 7 years old, had his right eye removed by Mr. Wordsworth on August 17, 1872. At that time he asserted that he had perception of light with it. The eye was much congested and the cornea uniformly opaque and staphylomatous, with a few large vessels near its surface. Its surface also showed two or three pigment dots. Tension was not noted before excision, but half an hour afterwards it was much —. The boy had a bad attack of small-pox about ten months before the above date and his eye became inflamed during his illness; he dated the eye-disease from the appearance of the rash, but was not certain of this.

An equatorial section was made after two months' treatment with Müller's solution. The sclerotic was not well hardened. A thin layer of fluid was effused between sclerotic and choroid, or more strictly among the lax tissue of the lamina fusca, separating the sclerotic and choroid by about $\frac{1}{20}$th inch (1·25 mm.); this did not extend backwards farther than about half-way between the equator and posterior pole of the eye. Corresponding to the choroidal detachment were several slight separations of the retina taking the form of close folds or plaits beginning at about the posterior limit of the choroidal separation and extending forwards meridionally to join a narrow annular detachment just behind the ora serrata; there were no corresponding folds in the choroid. The foldings of the retina were doubtless produced by

the choroidal detachment which of course diminished the size of the vitreous chamber; the natural elasticity of the choroid allowed it to retain its spherical outline, whereas the non-elastic retina, unable to contract when its contents (the vitreous) diminished, was obliged instead to become convoluted. Neither *retina* nor *choroid* looked thickened to the naked eye. The inner surface of the retina was spotted over with many little whitish elevations probably of the same nature as those on the outer surface of the hyaloid.

The *vitreous* was in a condition of inflammatory œdema; it became opalescent, brittle and gelatinous in Müller's fluid, changes which indicate albuminous infiltration; and it contained in all parts (the hyaloid and the centre of the vitreous also) a considerable sprinkling of inflammatory cells. The outer surface of the *hyaloid* was also mottled with little opacities consisting of hyaline globules (having the same refraction as colloid material) which were I believe some form or derivative of albumen. These bodies are extremely common in eyes recently inflamed and hardened in Müller's fluid. Microscopical examination showed changes in the *retina* and *choroid* indicative of early inflammatory œdema. The *choroid*, both around the disc and at the equator, was about twice its normal thickness and the chorio-capillaris infiltrated with round lymphoid cells. There was no change in the epithelium or elastic lamina. The thickening affected the chorio-capillaris and the deeper parts equally. The *retina* was not much altered in thickness, but its cells and fibres were rendered much less distinct than is normal, partly by swelling and close mutual apposition (as was the case with the cells of the granule layers which had even become polygonal by mutual pressure), partly by infiltration of structureless highly-refracting substance (albuminous fluid) between the nerve-fibres and among the nerve-cells. The fibres of Müller and the rod and cone fibres were thus almost entirely obscured. There were no inflammatory products in the nerve-fibre layer or in the sheaths of the retinal vessels, but oval and roundish cells of doubtfully inflammatory origin were present outside the central vessels of the *optic disc*; these may have been only the over-fed nuclei of the tissue itself. I could find no swollen nerve-fibres in the disc or neighbouring retina, the fibres being merely separated from each other by fusiform and oval spaces. The

most notable changes had however occurred in the *bacillary layer* in many parts of the retina. It is to be noticed that these were most marked at those parts where the greatest macroscopic change was observed, while at the posterior pole of the eye where no separation of retina from choroid or of the latter from the sclerotic had occurred, the rods and cones were perfectly normal, although even there the changes described above in the other retinal structures were present. Thus, assuming that the patient's statement as to perception of light was correct, it would well accord with the condition of the receptive parts of his retina at and about the yellow spot. The *rods and cones* at a short distance to the nasal side of the disc were elongated so as to equal in some parts almost a third of the thickness of the retina; the change affected all the rods and cones of any one part about equally, so that none projected to any great extent beyond the rest; here and there however one could be seen shorter than its fellows. This increase in length appeared to have taken place at both ends of the cones, so that while the inner end of each no longer rested on the *limitans externa* the outer (filamentary) part was considerably longer than it should be and terminated by a slightly bulbous swelling. The two parts of each cone often preserved their normal diameters, although when the change had gone a little farther the inner (bulbous) portion was generally swollen, having lost its regularity of outline and become variously distorted, so that the conical shape might even be reversed. Connecting the base of the cone with its granule was a foot-stalk or neck consisting of highly refracting, perfectly hyaline substance; it was sometimes nearly equal in length to the bulbous part of the cone, but generally not more than half that length; its thickness varied much in different cases, being sometimes as thin as the filament portion of the cone and in other specimens nearly as thick as the bulb itself. This new peduncle was also often more or less bent, and its distortion, high refractive index, and varying diameter gave it some resemblance to a bit of glass tube which has been clumsily drawn out and bent while hot. In the rods no proof could be given of the elongation at their inner ends, although it probably existed. At a later stage the hyaline foot-stalks of the altered cones and rods became longer, and at the same time thicker, more irregular and more or less fused together, while the bacillary elements them-

selves swelled up into globular or flask-shaped masses with the refraction of myeline. In all parts, even at the yellow-spot region, there was a thin layer of perfectly structureless substance (coagulated albuminous fluid) between the bacillary layer and the choroidal epithelium, and much of the pigment of the latter often adhered to the rods and cones being widely separated from its own cells. In many sections spherical bodies were seen in great numbers lying close to the outer ends of the rods and cones imbedded in the coagulated effusion just mentioned. These spheres were very finely molecular or almost homogeneous, of waxy or myeline-like refraction, and varied in diameter from that of one to two red-blood corpuscles; they were colourless. I have no doubt that these bodies, which are I believe well known to all who have examined diseased eyes, are derived from the rods and cones, for in many parts separate cones or rods were seen swollen at their outer ends into flask-shaped or globular beads of different sizes and with varying portions of the filament still intact, while others, lying perhaps close to them, were quite devoid of any remnant of the rod or cone. They closely resemble the changes which occur in the bacillary structures when chromic acid is used for hardening the eye, and are probably of the same nature, being produced partly by swelling of the rod or cone from imbibition and partly by the gradual shortening of the thin filament and its conversion into a sphere. In this and similar specimens however that the changes in question are undoubtedly the results of disease is evident enough. A section of the retina at the equator, and including one of the plaited detachments described above, showed less of the elongation and more of the terminal swellings in the bacillary layer than in the parts near the disc; no special change had taken place at the retinal folding, except the distortion and crowding of the rods and cones which was inevitable.

230. *Perforating Ulcer of Cornea after Small-pox—Excision four months later—Commencing Inflammation of Vitreous—Effusion of Fluid between Sclerotic Choroid and Retina.*

The left eye of John P., 12, Mr. Streatfeild's patient. He had small-pox severely four months before admission and was much scarred by it. The eye did not inflame till after he had

got up and was well enough to play about; his mother confirmed this account. When admitted, August 12, 1872, the left eye was much congested and the whole cornea irregularly staphylomatous, at places very thin and showing black iritic pigment through it. He had distinct perception of light with it. Excision was done the same day, and the eye placed for two months in Müller's fluid, and then examined.

The *sclerotic* was not well hardened by the preservative. There was a tolerably thick and uniform layer of fluid between sclerotic and choroid, or rather among the cells of the lamina fusca, extending forwards as far as the attachment of the ciliary muscle, and a much thinner layer between retina and choroid. As is usual in such cases, the *choroid* had preserved its spherical outline, but the *retina*, not being so elastic, had accommodated itself to the diminished volume of the vitreous by the formation of meridional folds with closely applied sides, which passed from near the ora serrata backwards beyond the equator but not as far as the disc; near the ora serrata they became continuous with an equatorial fold of detachment which encircled the eye. The hinder part of the retina was *in situ*. The *lens* was absent, its place being occupied by coagulated matter of somewhat spongy consistence from the presence of numerous little spaces in its substance. There was a central anterior synechia; the rest of the iris was thickened. The *vitreous* showed signs of albuminous infiltration (œdema), being converted into a softly gelatinous, brittle, nearly opaque substance, like soft apple-jelly. The *hyaloid* separated with great ease from the retina, retaining the depressions caused by the foldings of the latter; its outer surface was thickly dappled with small, whitish, ill-defined, slightly raised spots, and was also uniformly hazy; the spots consisted of clumps of hyaline albuminous (or colloid ?) globules, and the general haze was due to a thick sprinkling of large round or multipolar inflammatory cells, distributed almost uniformly, but sometimes slightly aggregated beneath (*i.e.*, on the *hyaloid* surface of) the heaps of clear globules above mentioned. The same cells were present in considerable numbers throughout the vitreous; they mostly contained one nucleus, but sometimes two.

182. *Perforating Ulcer of Cornea after Small-pox—Early Stage of Inflammation of Vitreous—Slight Fluid Effusion between Sclerotic and Choroid, and between Choroid and Retina.*

The right eye of Louisa G., 20, excised by Mr. Streatfeild, April 29, 1872; the eye was then painful, and immediately after excision looked slightly shrunken. She had been attending for a month with "staphyloma of cornea following ulceration after small-pox."

After five months' hardening in Müller's fluid, the *vitreous* was found to contain a number of opaque streaks which all radiated from a single point of origin between the lens margin and two or three neighbouring ciliary processes, as if after a wound. The rest of the vitreous was but very slightly, if at all, changed in consistence or naked-eye characters; perhaps slightly gelatinous. The *hyaloid* separated very easily from the retina and was dappled over with little white spots; these consisted of well-formed pus cells in great abundance and patches of pale, faintly cloudy matter in irregular granules, among which were a few small, round cells, like red blood-corpuscles. Some large amœboid cells were also present. The opaque streaks in the vitreous were composed solely of pus and some fibrinous threads; sections through the parts in the ciliary region from which these streaks radiated showed free suppuration of the *ciliary processes* with loosening and diffusion of their epithelial pigment cells in the most anterior part, and inflammation of the *iris*, with a thick layer of pus on its posterior surface which was continuous with that produced by the ciliary processes. The *ciliary retina* and *hyaloid* were full of pus in the same sections. In the corresponding part of the *cornea* were numerous groups of pus corpuscles, collected in enlarged corneal corpuscles. The *ciliary muscle* was free from purulent infiltration, although somewhat swollen and its fibre-bundles opened up. The relation between the suppurating part of the uveal tract and the corneal perforation was not ascertained.

There was slight separation of choroid from sclerotic, and of retina from choroid by fluid. The *choroidal detachment* was, as usual in such cases, uniform and without puckering; the *retina* on the other hand was raised into plaits which projected towards the vitreous and passed from the ora serrata, where there was a

narrow complete zone of detachment, backwards; none of them reached so far as the optic disc. The *choroidal epithelium* very easily separated in flakes, leaving a pale grey surface exposed, the *choroid* proper being somewhat thickened and paled in colour at the equator, probably by purulent inflammation. The *lens* looked healthy to the naked eye.

233. *Perforating Ulcer of Cornea after Small-pox—Loss of Lens and Vitreous—Excision one month after perforation of Cornea. Detachment of Retina, fibrous thickening of Choroid—Cholesterine in subretinal space—Eye previously "weak."*

The right eye of Dennis B., 47, an Irishman, excised by Mr. Hutchinson, August 1, 1872. Seven weeks before excision he had small-pox; the eye was affected quickly after the rash came out, and "the sight fell out one morning on to the table before him," about a month before excision. He had much pain till "the sight came out," but it ceased soon after that. The other eye was normal throughout. The right (lost) eye had been more or less "weak" for four years past, since he got some lime and gravel into it; "being a weak eye, I suppose the pock pitched in it."

The eye was much shrunken, and scarcely any cornea was left. There was neither lens nor vitreous, the retina being detached and shrunken. The subretinal space contained fluid, in which there was a good deal of cholestearine. The choroid was much thickened by tough white tissue.

111. *Staphyloma of Cornea after Small-pox Ulcer.*

One eye of Harriet J., 13, excised by Mr. Hulke, November 18, 1871. At the time of excision the cornea was staphylomatous, and it burst during excision, allowing most of the contents of the globe to escape. A cursory naked-eye examination detected no disease of *retina*, *choroid*, or *ciliary body*. The *lens* and *vitreous* had escaped. The girl had small-pox five months before excision; it was tolerably severe, and left many moderate pits on her face. The eye inflamed about two days after the rash came out and never recovered. She was vaccinated in infancy and showed two well-pitted scars on her arm; no re-vaccination had ever been done.

141. *Eye lost by Corneal Disease after Scarlet Fever*, 10 *years*—*Irritability of other Eye* 9 *months—Thin layer of bone on inner surface of Choroid.*

The left eye of George W., 19, excised by Mr. Streatfeild, February 5, 1872. It was lost gradually, probably by corneal ulcers, soon after scarlet fever 10 years before excision; he was weak and out of health at the time, and the other eye was inflamed at the same time but got well again. The right eye had been subject to attacks of dimness and redness for about nine months before he came under care, but no permanent damage had resulted. In the lost eye a large thin concave *plate of bone* surrounded the optic nerve on the inner surface of the choroid and at one part reached forward to the ciliary body. In all probability it was the formation of this bone which had set up the sympathetic irritation in the other eye. The *lens* was calcified, being hard on the surface and mortary within. *Retina* detached; cholestearine in subretinal space. *Lens capsule* appeared to the naked eye semi-opaque but not calcified.

189. *Eye Inflamed during Scarlet Fever* 11 *years before excision —Sight lost gradually but not completely till after a blow* 4 *months before excision—History of many relapses of Inflammation since the first failure—Chronic Connective-tissue Hypertrophy of Choroid and Retina—Atrophic Cupping of Optic Disc—Old Subretinal Effusion, with partial detachment of Retina—Commencing Ossification in Choroid close to Disc—Recent Blood in Anterior Chamber, Vitreous, &c.*

Philip H., 21, Mr. Lawson's patient, had "scarlet fever" severely when 10 years old; he was in bed three or four months and was expected to die, passing blood from the bowels. He had a red rash, which his medical man called scarlet fever. His right eye inflamed during or very soon after the above illness and remained always afterwards liable to relapses of redness and pain from very slight causes. He believes he could see shadows with it till Christmas Day, 1871, when it was injured by a severe thrust from a fellow-servant's finger. There was much swelling and "blackness" of lids after this injury. When he came to the hospital, on May 7, 1872, there was blood in the lower part

of the anterior chamber, pupil large, and apparently the iris was deficient at the upper part, as if after iridectomy; no operation had ever been done, and the appearance was probably due to retroversion of that segment of the iris from the blow. The area of the pupil was yellowish and opaque. The patient was a florid man with dark hair. Mr. Lawson excised the eye at the same date and made a cursory examination of it at once after opening it in the antero-posterior direction directly after excision.

The pupillary margin of the *iris* was adherent to the lens-capsule from past iritis. The *lens* itself was soft and semi-opaque, and had patches of yellow dense opacity in various parts, chiefly peripheral. There was much diffused blood in the *vitreous* which evidently came from the ciliary body, in whose neighbourhood it was most abundant and partly coagulated. The vitreous itself was tough in front and contained there many spindle-shaped inflammatory cells; behind it was fluid. There were several folds of *retinal detachment*, chiefly in front, as if caused by the dragging of inflamed and contracting vitreous; elsewhere it was *in situ*. Its veins were much gorged with blood. The most peculiar feature was the presence of numerous whitish yellow dots, apparently in the retina; they covered almost all its lower half, but extended also above the disc; in many places they had coalesced into almost uniform areas of dense opacity. These white patches were all beneath the retinal vessels. Further examination, after the eye had been hardened in Müller's fluid and alcohol, proved that the greater part of the white deposit was *between retina and choroid*, where it formed a layer, absent in some parts, and of varying thickness, but nowhere thicker than the retina. This effusion was composed chiefly of dark-coloured compound granule corpuscles (stained partly by the preservative fluid, partly perhaps by blood), imbedded in a finely granular, structureless matrix (coagulated albuminous fluid), and mixed with a good many free red blood-corpuscles and a few lymphoid cells, probably white blood corpuscles. There were also a number of small white granules, quite visible to the naked eye and consisting of crystals resembling those of triple phosphate, of which they were probably composed. On making sections of the *retina* its bacillary and outer granule layers were found to be entirely replaced in many parts by masses of the same rust-coloured granular corpuscles as were present between retina

and choroid; many of them were nucleated, and the nuclei often coloured more deeply than the rest of the cell; similar corpuscles and coloured (blood) granules were present in some parts of the hyaloid. In all sections every part of the retina was thickly strewn with new cells bearing a general resemblance in size and shape to those of the inner granule layer, but often a good deal larger and of various elongated forms. The individual fibres of Müller were thickened. There was hardly a trace of the bacillary layer, only here and there two or three cones or rods. At the *disc* the nerve-fibres were very highly atrophied, and a deep cup with very steep but not overhanging sides was the result. The *retina* at a distance from the disc in the lower part of the eye was increased in thickness from twice to three times, but in other respects resembled the part already described. The *choroid* was also much thickened in all parts, except close to the disc where it gradually assumed nearly its normal dimensions. The increased growth had occurred in all parts from the chorio-capillaris to the lamina fusca; in the former part the new tissue consisted of colourless spindle-cells or fibres, with large nuclei and loosely packed together; while in the deeper parts the pigmented multipolar cells were increased, both in size and number, and had produced a very abundant network of fine, separate, highly refracting fibres which did not curl up if broken, but in other respects looked like elastic tissue. At the choroidal rim of the optic disc a narrow ring of finely fibrous tissue with closely packed nuclei had grown in the chorio-capillary layer to a thickness of from two to three times that of the normal choroid; on one side of the disc its deeper half or two-thirds was ossified, on the other side it contained no bone. The elastic lamina and a few epithelial cells could be traced over it. The epithelium of the choroid generally was nearly normal, its cells being perhaps a little enlarged and rather ill-defined; here and there it had undergone proliferation; the new cells had grown to gigantic proportions and had developed a uniformly and finely granular substance in their interior which was arranged so as to produce an appearance of thin short lines radiating from the central part of the cell. These large cells contained very little pigment.

160. *Incipient Detachment of Retina by the contraction of a Fibrous Vascular Band traversing the Vitreous—Eye Lost 13 years before excision by Perforating Ulceration of Cornea.*

The right eye of Anne F., 16, Mr. Lawson's patient, excised March 12, 1872. The cornea was opaque everywhere and flat, and the eye after excision found to be very slightly shrunken. Both eyes were severely affected when she was three years old, after having "scarlet fever and measles;" the right was lost, and the left much damaged by large corneal opacities which were present when right was excised. The right had rarely given her much pain, but it had lately been more painful than usual, and the left had sympathised by becoming intolerant of light.

After hardening in chromic acid a vertical antero-posterior section was made to the inner side of the optic nerve. The *vitreous* was for the most part fluid, but in front it was too stringy, although not opaque. *Stretching across the vitreous* chamber was a thin but *tough string*, attached behind to the retina, at and close to the disc, by an almost tendinous expansion. In front the shreddy portions of the string near the ciliary body were freely scattered with large corpuscles, some round, others multipolar.

The part of the retina to which the hinder end of this cord was attached had become split into two layers, the outer being in normal contact with the choroid, the inner forming a hollow cone whose apex was continuous with the vitreous string above described. Vertical pillars joined these two layers of the retina. From the foot of the fibrous cord various bands of thickening passed in different directions into the retina, and there were also some strings in the front of the vitreous. The rest of the retina was *in situ*.

A *microscopical examination of the cord* traversing the vitreous showed it to consist partly of fibrous tissue with large branching cells, and partly of a longitudinally fibrous substance devoid of cells or nuclei. It was attached to the optic disc, which it entirely covered. The retina all around its base was thickened and contained an unusually large number of blood-vessels; many of these passed for a short distance into the cord and one was traced through about half its length. The last-named vessel was a very large one and was directly continuous with one of the main central vessels of the optic nerve. As before

stated, it could not be traced further than about half the length of the cord, ceasing to be visible where the latter became very thick and opaque, while in the thin membranous anterior expansions of the new tissue no vessels were visible, although a careful search was made. No inflammatory (corpuscular) elements were present in any part of the fibrous cord, and it was only where it became continuous in front with the hyaloid membrane that the cells already described in the latter made their appearance. The *retina* (except the thickening of its nerve-fibre layer above mentioned) showed no obvious changes near the disc, all the strata being easily recognised, including the rods and cones. There was some heaping up of choroidal epithelium near the edge of the disc but no striking changes in any other layers of this membrane. The *lens* was absent; its *capsule* was thickened and, together with the iris, adherent to the central part of the thickened cornea.

135. *Kerato-Iritis, said to have followed Measles, one Eye becoming blind* 13 *years before excision—Sclero-Corneal Staphyloma* 2 *years before excision—Pupil excluded and occluded—Lens shrunken—Optic Disc cupped—General thinning of Sclerotic and Cornea.*

The left eye of George F., 30, excised by Mr. Bowman, May 7, 1872. At the date of excision the upper part of the cornea was very staphylomatous, the protrusion occuping two-thirds of the circumference and involving the sclero-corneal junction. The cornea was smooth, but a broad band of haziness nearly crossed it horizontally and its margins were nebulous. The iris was brown and drawn slightly backwards to the pupil, which was very small, occluded, and drawn somewhat upwards. In the other eye the cornea was nebulous and pupil almost closed; the corneal opacities were partly marginal, like arcus, partly central. V with this eye was 8 J.: T. n. He stated that both eyes had been inflamed after measles in infancy, and he could never remember to have seen well. Thirteen years before excision the left eye inflamed, and in about six months became quite blind; it seemed probable from his medical attendant's statement to him, that the staphylomatous condition was not of more than two years' duration at date of excision, and until a short time

before the latter operation the eye had not troubled him; it then became painful, and remained so till removed. Sixteen years before excision the same eye was operated on for squint. The other eye had also suffered a relapse of inflammation about six years before admission, several years after the left had become quite blind.

The eye was examined after hardening for two months in Müller's fluid, and I am indebted to Dr. Buller for much of the description. Its antero-posterior diameter was not increased. There was complete exclusion of the pupil, the pupillary margin of the iris being firmly adherent to the lens-capsule, while its peripheral part was bulged forwards and outwards by fluid which had enormously distended the posterior chamber, and in addition had caused the bulging and attenuation of the tissues at the corneo-scleral junction; these changes were most advanced at the upper part. The central part of the anterior chamber was deep, the margin shallow. There was deep *excavation of the optic disc* at its inner side. The *cornea* and *sclerotic* were both uniformly and moderately thinned. The *lens* was shrunken equatorially and consequently too convex; there was compensatory elongation of the suspensory ligament, this structure being everywhere intact. *Microscopical examination* showed the central part of the *iris* firmly attached to the front of the lens capsule by wavy, fine fibrous tissue. The capsule itself was quite normal, and the only decided change in the *lens* was the existence of very large oval cells, or cell-like bodies, within the posterior capsule near the equator; they resembled the nucleated ends of lens-fibres in refraction, but were much larger, contained no nuclei, and were not seen to be continuous with fibres. They differed from the myelin-like globules which exude from swollen lens-fibres.

Rheumatic Inflammation.

181. *Chronic Irido-Cyclitis, leading to formation of Opacities in Vitreous—Secondary Cataract (and in one Eye Detachment of Retina). Delayed Symmetry—Some of the Symptoms simulating Glaucoma—Excision and Dissection of one Eye—Cause of Disease probably Rheumatic.*

Richard G., 60, first came to the hospital in February, 1867, under Mr. Dixon's care, on account of his right eye, the diagnosis

written on his letter being "cataract in right, detachment of retina, and floating bodies in vitreous." He attended till September. In February, 1870, he again came to the hospital, under Mr. Hutchinson's care, complaining of the other (left) eye. The lens was slightly opaque, the retinal *veins* pulsated, and he complained of seeing halos round flames. At a later date (October) the notes state that the above symptoms continued, the tension being doubtfully a little increased and the vitreous full of floating bodies. The pupil was active, there was no cupping of the disc, and no inflammatory symptoms. The *right* eye at this time showed a complete, chalky looking cataract and contracted pupil; after atropine the latter dilated and several posterior synechiæ came into view.

History.—He states that the right eye first failed a short time before he first came to the hospital; it was "blood-shot," but he does not speak of pain as one of the symptoms. There is no satisfactory history of any constitutional cause for failure of his eyes, but this may not improbably have been due to the arthritic diathesis, for he has decided evidences of chronic rheumatic arthritis in the presence of bony lips on his femoral condyles; he appears however never to have had any marked symptoms of rheumatism. He denies having had any kind of venereal disease and shows no signs of tertiary syphilis; and his only child presents nothing suggestive of the inherited disease. At the date of excision the right eye was quiet, the pupil small and round and occupied by a chalky looking cataract, the iris blue. It was excised by Mr. Streatfeild (in Mr. Hutchinson's absence), April 29, 1872.

The specimen was cursorily examined at once, and again more carefully after treatment with Müller's solution. The retina was found detached in funnel shape, and shrunken so as quite to obliterate the posterior half of the vitreous chamber, while the front half was much reduced. The detachment in most parts extended considerably beyond the ora serrata. The retina was still be... transparent. The subretinal fluid had unfortunately escaped throu... a small hole made during excision and could not be examined on the choroid in... There were very numerous small elevations uniformly covered ... front of the equator ("colloid" bodies), still serrata there we... by epithelium; in the neighbourhood of the ora ...re a few patches of irregularity of epithelium,

but elsewhere there were no naked-eye changes in the choroid. The vitreous, very small in quantity, was tough and stringy, and still tolerably clear; the hyaloid was firmly adherent to the retina, and consisted entirely of cells either round, multipolar with fine processes, or spindle-shaped. At the centre of the vitreous, near the back of the lens, a fine cord projected backwards towards the disc, though it could not be traced so far as that part; it was composed of modified spindle-cells, much elongated, somewhat fused together, and at the same time stiff and brittle (after treatment with Müller's solution). There was a patch of recent blood as large as a mustard seed, and consisting of well-formed corpuscles, close to the back of the lens; there was also a great deal of dark brown pigment near the back of the lens, especially near its posterior pole, and about the axial fibrous cord described in the vitreous. The pigment was partly in fine granules scattered or more or less aggregated; partly collected in the cavities of numerous compound granule corpuscles of various sizes, and containing well-marked nuclei; partly (but to only a small extent) in the interior of the spindle-shaped cells of the vitreous and hyaloid. Probably all this pigment was derived from old hæmorrhages. No distinct evidence of blood-vessels could be made out in the vitreous, although they were carefully searched for. Sections of the *lens* (not including its capsule, but containing some of its intra-capsular cells) disclosed fatty degeneration of many parts with great hyaline swelling of many of the intra-capsular cells. The fat globules, often of large size, formed strata of varying thickness in the superficial layers, the nucleus of the lens being quite free from this change; in one place near the equator a double rift had occurred, enclosing a wedge-shaped portion of lens-structure whose *central* part alone had undergone conversion into fat globules, probably because it was furthest from nourishment. A layer of homogeneous clear (probably albuminous) effusion was present immediately beneath the intra-capsular cells in many parts, and immediately upon the most superficial layer of fibres a thick deposit of variously sized oil-globules had taken place. The nuclei of the deeper equatorial layers were often enclosed in larger chambers filled by clear hyaline substance, and somewhat resembled in appearance cartilage cells.

207. *Relapsing (Rheumatic) Iritis in each Eye—One Eye ultimately lost by Irido-Cyclitis and Diffuse Choroiditis (chiefly of anterior part of Choroid)—Hæmorrhage between Choroid and Retina—Plastic Inflammation and great Thickening of Iris and Ciliary Body with passage of Embryonic Connective Tissue through apertures in Lens-Capsule—Patient the subject of Chronic Rheumatic Arthritis.*

Mary T., 53, Mr. Critchett's patient, stated that her first attack of eye disease occurred 12 years previously, in the right eye (the one afterwards excised); it was attended by pain and dimness. A second and similar attack came on 5 years later, and a third 4 years after the second. The third ended in total permanent blindness. The left eye was first affected about when the third attack happened to the right; it was not painful at that time, however. At the date of admission, June 14, 1872, the right eye had again been inflamed and very painful for three months, and it is probable that the corneal opacity came on at this time, for she said that until this attack the blind eye looked externally just like the other and was not "white" till quite lately. A similar attack occurred to the left eye a month before she came to the hospital and this time it was accompanied by much pain. Vision was much damaged during this attack; on admission she could not distinguish one person from another; there was closed and excluded pupil, iris bulged forward, ciliary sclerotic thinned, and T. —. Iridectomy was performed.

Condition of right Eye.—Cornea densely opaque at centre and extensively hazy elsewhere, its margin remaining very nearly clear except at inner part; at the same part its surface was slightly roughened, elsewhere being smooth. Iris of a curious tortoiseshell colour and pattern, being abruptly patched with black, buff-yellow and a little white. Slight congestion of globe. Excised same day.

History of Rheumatism.—For 15 years she has been liable to rheumatism in various joints and the loins, chiefly in left ankle, left ring finger (which has become partly stiffened in consequence), and in knees. The left ankle is now weak, and there is decided grating in the right knee. She has been laid up several times by the rheumatism; the first attack was in the left ankle, and she attributed it to having lived on a damp, brick-

paved floor. Her mother used to have "rheumatism" in her hands; they used to "swell up." No other family history of arthritis in the family. The patient is married but has never been pregnant.

The right eye was placed for four months in Müller's fluid, when the sclerotic was well hardened. The *retina* was found detached and much shrunken, the subretinal space being full of coagulated blood and albuminous fluid, the latter converted into a solid mass resembling in consistence apple jelly. The *choroid* was everywhere more or less thickened, apparently by infiltration with similar coagulated serous fluid; this change was most advanced in front, gradually diminished from before backwards, and was least developed close to the disc. The choroid was not examined microscopically. The whole choroid adhered somewhat too firmly to the sclerotic. The *iris* was in contact with the cornea, much thickened, and apparently adherent all over to the lens capsule. The *lens* was too convex from equatorial shrinking, and contained irregular streaks of opacity.

Microscopical examination showed that the thickening of the *iris* was due to its conversion into a sort of granulation tissue in various stages of development and covered in front by two or three rows of long, spindle-shaped cells or fibre-cells, probably remnants of the muscular layer; this surface was in close apposition with the epithelium of Descemet's membrane, a few cells of which were seen here and there. The deep layers only of the cornea were examined, and showed no change. The chronic inflammatory process involved the *whole ciliary body*, and to a less degree the overlying sclerotic. The ciliary process was not recognisable as such, being converted into a mass of round-celled structure. In the part corresponding in position to the *ciliary muscle*, the new cells were much more separated from each other by a hyaline, dimly fibrous, wavy, intercellular substance. The *lens capsule* showed numerous very evident striations, parallel with its surfaces; it was probably a little thickened, and in parts was puckered. In two or three places near the equator, on one side (the other side not examined), the *capsule showed apertures* the largest of which was equal in width to about twelve times its thickness; their edges were in all cases more or less bevelled off. These holes in the capsule were filled by cells continuous with those in the ciliary process or iris; they

passed into the capsule and spread far and wide on each side of the entrance. The cell elements of the inflamed tissue close to these capsular openings were larger, more closely packed, and less clearly defined than those in other parts of the iris, &c., and the same description applies to those filling the holes and lying within the capsule. Many of them were very large and provided with irregular amœboid processes, and they bore some resemblance to the cells of a giant-celled sarcoma. None of the proper intra-capsular epithelium was seen, but in its place on the front of the lens and at a distance from the apertures, there were long spindle-cells or fibres with granular contents, probably incipient connective tissue derived from the new cells which had gained access through the holes in the capsule. There were many large tracts of distorted and ruptured lens-fibres and spaces filled with myeline globules and broken fibres; some of these were probably *post-mortem* changes, but they were much more abundant than is usual from the mere action of preservative fluids.

116. *Glaucoma with slight Iritis in one Eye—Commencement of Symptoms eight months—Eye Blind three months—History of Rheumatism in patient and her father.*

Sarah G., 43, was under Mr. Streatfeild's care, December 11, 1871, at which date her right eye was excised. She said that she had begun to see colours around objects with this eye about eight months before. She had since then suffered a great deal of pain in the eye, and it had been quite blind for three months before excision. At above date right eye T + 2; no perception; cornea steamy; scleral congestion chiefly ciliary; posterior synechiæ. Cataract chiefly posterior. Left eye, vision $1\frac{1}{2}$ Snellen; hypermetropic.

The eye was hardened for 24 hours in chromic acid, and divided transversely. There was nothing of special pathological importance visible to the naked eye. The *disc* was deeply cupped, the posterior surface of the *lens* showed a streaky, spermaceti-like opalescent appearance, but was not quite opaque; the deeper and anterior parts appeared transparent. The *iritis* had been only slight, judging by the readiness with which the synechiæ broke down; there was no membrane across the pupil, nor any visible lymph on the posterior surface of the iris; some pigment remained on the lens capsule.

The *vitreous* showed no naked-eye changes, with the exception of recent blood effused into it in two places, from the centre of the disc and from the hinder part of the ciliary body at the lowest part of the eye. The blood was quite fresh. That from the optic disc projected about $\frac{1}{10}$ inch (2·5 mm.) straight forwards into the vitreous. Probably, as Mr. Streatfeild suggested, the bleeding occurred during the squeezing to which the eye was necessarily subjected while being excised, its tension being already much increased. A somewhat cursory examination under a magnifying power of 30 diameters failed to detect any ruptured vessels in either situation.

Eight years before admission this patient had a severe attack of "rheumatic fever," which laid her up for four months; before that and since she had been liable to aching in her joints. She had small-pox when 16 years old. Her father was stated to be often laid up by rheumatism in his knees.

122. *Eye lost gradually in 4 years by (recurrent?) Irido-Choroiditis—Secondary Glaucoma—Excision 16 years after it became Blind—Other Eye never affected—Anatomical Changes—Old disseminated and equatorial Choroiditis, old Retinitis with pigmentation, closed Pupil, absorption of Lens, excavation of Optic Disc—Cause of Eye Disease doubtful, Syphilis or Rheumatism—Suspicious history of Secondary Syphilis when Eye first failed—Definite history of Chronic Rheumatic Arthritis in patient and near relatives, and abundant evidence of articular changes caused by it in patient.*

As the morbid appearances found in this specimen are of considerable interest, more especially those in the choroid, and led me to expect that the woman was remotely syphilitic, I will record as much of her history as I was able to get. For many years she had been subject to chronic rheumatism, chiefly in her knees, never however bad enough to lay her up. At the date of admission there were large lips on her femoral condyles, loose or pedunculated bodies in the knee joints, and grating on movement. She said that most of her children and both her own sisters had suffered from "chronic rheumatism." She did not know of any gout or rheumatic fever in the family. The evidence of syphilis was slight. Twenty years before admission

she had a bad "ulcerated throat on both sides," "a quinzy," and at the same time had a severe eruption on the head and fronts of elbows. This rash, however, she had been subject to for years before the sore throat. She never again had such a bad throat as the one referred to. I asked her directly about the primary disease, and she was not aware that she had ever caught anything from her husband. There was not any history of suspicious symptoms in her children. It was at about the time when she had the ulcerated throat that her right eye began to fail. It gave her some pain, and was inflamed. The failure of sight was gradual, and it was not till four years later that the eye became quite blind (*i.e.*, sixteen years before excision). This history is much more like that of recurrent iritis followed by glaucoma than of syphilitic iritis. At the date of admission, December 15, 1871, I examined her *left* eye with the ophthalmoscope (with undilated pupil), and could find no evidence of disease. Condition of *right* eye at the same time, T. + 2, commencing ciliary staphyloma, pupil small and excluded, cornea rough and an arcus senilis at its border; excised the same day. The right eye was excised December 15, 1871, and after one day's hardening in chromic acid was divided vertically from behind forwards to the inner side of the optic nerve. There was deep excavation of the *optic disc*. The *retina* was *in situ* everywhere. There was extensive old disease of the *choroid*, especially at the equatorial region; this consisted for the most part in numerous highly pigmented dots of various sizes, none larger than a small pin's head, but there was also a very large patch of almost complete atrophy of the choroid extending from the upper part of the equator downwards and backwards on the nasal side and showing the white sclerotic through it. The retina closely adhered to many parts of the diseased choroid. *The microscope* showed in the *retina* and *choroid* advanced atrophy, evidently consequent on inflammatory changes; the bacillary layer was absent everywhere; the nerve-fibre and nerve-cell layers were much atrophied, the former being represented by a thin stratum of fibrous structure, and the latter often replaced by small round spaces filled with almost homogeneous substance (albuminous effusion into nerve-cell spaces?). The connective tissue of the retina was much thickened in all its parts, and the *limitans externa* was often replaced by quite a thick layer of fibrous tissue. Much choroidal

epithelial pigment had passed into the retina, and some was still close to the outer surface as if stopped in the act of being pushed or drawn inwards. Some of the pigment surrounded the retinal vessels, both large and small ones, in all parts of the retina, but the majority of it was in the form of separate, spherical, brown masses a little smaller than choroidal epithelium; that around the vessels was composed of the same round masses, but heaped together, more irregular and of darker colour, as if the fluid had been abstracted from several of the brown globular elements and the pigment of them all had become more or less fused together. The *choroid* was everywhere more or less atrophied. At the large white patch above mentioned scarcely anything except the elastic lamina remained; in other parts, except in the equatorial region, the epithelium was generally pretty regular, the elastic lamina was thickened to twice its normal dimensions, and here and there a "colloid" pedunculated growth projected from it into the retina; the vascular part of the choroid was so atrophied in all parts as only to equal in thickness the epithelial and elastic strata. Another change of importance was *detachment of the hyaloid* as far forwards as the ora serrata, so that it formed in that situation a thin transparent diaphragm across the eye. The sub-hyaloid space contained a coagulated albuminous fluid with fatty or perhaps calcareous granules in small number. The *lens* had been completely absorbed, its capsule remaining in an opaque and partly calcified state; the anterior layer was inseparable from the fibrous membrane which glued it to the pupillary edge of the iris. The *iris* was in contact with the cornea but not adherent to it; with the exception of the new fibrous tissue at its pupillary border it looked healthy to the naked eye.

Glaucoma.

173. *Glaucoma said to have followed a blow—Iridectomy, without relief of symptoms, three weeks after commencement of disease—Excision six weeks later—Early stage of Inflammation of Vitreous—Retinal Hæmorrhages—Disc not cupped.*

Catherine D., æt. 44, Mr. Couper's patient, was admitted on March 5, 1872, with glaucoma of her left eye. The symptoms had been present three weeks, and she said that they had begun the day after she received a blow on the eye from a child's fist. The

symptoms were T. + 1, shallow anterior chamber, steamy cornea, bulging iris, great pain; the fundus could not be illuminated. She had perception of light with the eye. Iridectomy was done the same day. The wound healed well, but the operation was not followed by any material relief to the pain, and the sight became gradually worse. Six weeks afterwards the T. was + 2 and the cornea steamy; there was still perception of shadows. At this date (April 16) the eye was excised.

It was kept in Müller's fluid five months, and the coats were then moderately hard. The *vitreous* was in an early stage of inflammation, semi-opaque, softened and less tough than normal, and the hyaloid separated very readily from the retina. There was a good sprinkling of inflammatory cells on the hyaloid, round, oval, or with incipient processes, and with large nuclei; some were dividing into two or three. There was a thin string of unusually tough vitreous adhering to the disc. The *disc* was carefully examined, and found not to be cupped. The *retina* appeared to be *in situ*, but proved on careful examination to be separated from the choroid over many large patches, both at the fundus and in front of the equator, by a very thin layer of soft, white, opaque, pultaceous substance. This was composed of structureless coagulated effusion, together with many of the rods and cones which had remained behind when the retina was removed. The rods and cones appeared for the most part quite normal, but among them were numerous round corpuscles of waxy or oily refraction and various sizes, perhaps derived from some of them which had undergone change. There were no other obvious changes of the retina in sections examined at and near the optic disc. The *chorio-capillaris* of the corresponding part was much thickened but did not contain any appreciable number of inflammatory cells. The *choroidal epithelium* sometimes adhered to the retina in preference to the *lamina elastica*. In various parts of the *retina* there were small extravasations of blood scattered at long intervals, and not numerous. They were composed of round granules of irregular size and of diffused colouring matter, and their borders were ill-defined. Several were situated close to capillaries; others were almost in contact with large vessels, from which however it is not probable that any of them were derived; probably they were all of capillary origin, in support whereof was the existence on one capillary of a minute globular

aneurismal dilatation. The *lens* was displaced towards the iridectomy scar; its equatorial diameter was diminished and its antero-posterior dimension increased, so that it was much more convex than normal. On its anterior surface, near the iridectomy scar, was a small nipple-shaped prominence, but I could not ascertain whether the capsule at this spot was entire or not. There was some proliferation of the intra-capsular epithelium in the neighbourhood of the before-mentioned prominence, where its cells were polygonal or sub-columnar not flattened. Over the prominence itself the cells were not identified and the lens-fibres of this part were pressed into a homogeneous hyaline mass. In some sections this epithelium was traced for a considerable distance behind the equator and the cells of its terminal parts instead of being multiplied were often much enlarged and hyaline. The formation of new lens-fibres from the epithelium appeared still to be going on at the equator. There was also proliferation of some of the fibre-nuclei in the superficial equatorial layers. The morbid prominence on the front of the lens was due to the distortion and separation of the lens-fibres by large spherical myeline-like globules which pushed them forwards. Probably the globules were derived from swollen fibres. There was no naked-eye appearance of disease in the iris beyond the result of iridectomy.

132. *Iridectomy for Glaucoma—Lens pricked—Excision one month later—Hæmorrhage between Choroid and Sclerotic.*

This specimen was interesting as showing a good example of the intraocular hæmorrhage which sometimes occurs after iridectomy for glaucoma, and after operations for the extraction of cataract. The eye had failed gradually with occasional "rainbows" and attacks of pain for 4½ years when the patient, Anne M., æt. 55, applied in December 1871 only able to count fingers with the bad (right) eye, and T. + 3. During iridectomy the lens was accidentally pricked; inflammation followed; the cornea ulcerated and the wound did not thoroughly heal, while the pain continued and became worse requiring excision just a month after admission. The cornea burst and some lens matter escaped during excision, the sclerotic collapsing somewhat. After being hardened in alcohol a transverse section was made. A

thick but unequal layer of blood was found *between sclerotic and choroid*, the latter coat being detached in such a way that its cross section enclosed a four-sided space, the sides of which corresponded to the four recti and the angles to the intermuscular spaces. In front the clot was bounded by the attachment of the ciliary muscle and behind it extended up to $\frac{1}{8}$ inch from the disc where it abruptly diminished and almost ceased, being however continued as a very thin layer all over the fundus. The *retina* near the disc was thickened, and I could not be certain whether there had been cupping of the latter part or not. There was a little red blood in the vitreous, but no considerable amount.

143. *Eye lost by simple chronic Glaucoma—No pain for several years, but beginning two years before excision, and relieved for several weeks by iridectomy, but returning with great severity, and requiring excision—History of severe Dental Neuralgia just before failure of Eye—Gout in the family.*

Eliza H., æt. 33, single, Mr. Wells's patient, stated that a "spot" came before her left eye five years before admission; this gradually increased in size and ended in complete extinction of sight eighteen months before excision. For the first three years she had no pain; at that time pain began, being at first slight and occasional, but for a year before excision very severe. The pain was relieved and the tension reduced to normal for a few weeks by iridectomy about six months before excision. She soon again began to suffer very severely, and this time the pain was somewhat regularly intermittent, lasting about 24 hours and then ceasing for the same time. The eye was excised February 9, 1872. She said that just before the left eye began to fail she had an attack of "fearful neuralgia" of the left upper jaw and that she had several decayed back teeth in the same jaw drawn without benefit. She stated also that during the more recent severe pain in the left eye the corresponding side of the nose was red and tender. Chronic glaucoma began in the other eye about four years later than in the left, and was stopped by iridectomy after she had allowed it to progress for six months. The patient was a nervous woman with dark hair and blue irides. Her father, who was an abstemious man was she believed not sub-

ject to either gout or rheumatism, but his brother, a publican, had suffered severely from gout. The father of these two men was said not to have been arthritic.

In the excised eyeball the ordinary *cupped disc* of glaucoma was found, and sections were made of the ciliary region and cornea to show the condition of those parts after iridectomy. The iris had separated at a short distance from its ciliary border, leaving a small projecting stump. The scar was just in front of the sclero-corneal junction.

Malignant Tumours.

236. *Glioma filling the Eye and protruding at the Ciliary Region—Symptoms known for eighteen months.*

Thomas Jeffery, æt. 4 years, living at the "Rose and Crown" public-house, Hemel Hempstead, was brought to Mr. Critchett on August 27, 1872, on account of his right eye, which was quite blind. It presented a complete ciliary staphyloma, the bulging being slight at the upper and outer quadrant, but very large at the remaining three-quarters. The most prominent part was soft, of dull brownish-grey colour, not black or bluish, and large vessels ramified over it. The larger (*i.e.*, inner) part of the ciliary bulging was continuous with a very vascular granulation-like substance growing from the nasal half of the iris and apparently quite filling that part of the chamber. The pupil, a narrow slit, was displaced upwards and outwards. The eye was kept for three months in Müller's fluid, and then divided nearly vertically from behind forwards.

The whole eye was filled by a soft greyish growth interspersed with streaks and patches of white softer material. No *retina* could be found and the *choroidal line* (traceable by its pigment) was much broken and in parts separated by a thick layer of growth from the sclerotic. The *growth* was firmly adherent to the sclerotic at the bulging part, where the latter was very thin and at parts probably quite absent. The *iris* was extensively infected and formed, in fact, the front boundary of the tumour. The *lens* was lying imbedded *horizontally* in the growth at the upper and outer part of the eye, the lower part of its edge having been no doubt detached and pushed upwards and backwards, while the upper

and outer part remaining for a time attached to the ciliary processes dragged the latter and with them the iris backwards, and so caused the displacement of the pupil. On the *outer* surface of the sclerotic, about $\frac{1}{8}$ inch (3·125 mm.) below the optic nerve, there was a mass of the growth as large as a split pea. From the position of the lens it seems likely that the tumour began in the lower and inner part of the eye, and that it quickly infected the uveal tract of the corresponding part and thus grew outwards towards the sclerotic as well as inwards.

Microscopically it was found to consist entirely of small cells, generally round, sometimes oval, and often with one or more angles and short processes as if produced by mutual pressure. They varied a little in size and averaged about $\frac{1}{3000}$ to $\frac{1}{4000}$ of an inch (·0083 to ·0062 mm.) in diameter. In the soft white streaks the cells were shrivelled and contained many little oil-specks. In one part close to the sclerotic they were rather larger and more oval than elsewhere. In all parts except the soft degenerate streaks the cells tended to adhere in clumps formed of many cells piled on one another.

There was no naked-eye evidence of disease of the cut end of the *optic nerve* on the eyeball; it was cut close to the eye. Microscopical examination of many sections was made but no evidence of malignant disease was found; the fibrous framework of the nerve was however decidedly thickened, being doubtless hypertrophied in consequence of the increased supply of blood to the diseased retina.

I learnt on inquiry from the child's father that in December he was in good health, and that nothing appeared to be growing in the orbit.

History.—The child was very unhealthy in infancy but no details of its symptoms could be gained. At the age of about two years it had a severe illness, which the medical man called "fever," and was not expected to live. Eighteen months before excision a "small white speck on the coloured part of the eye" was noticed for the first time. During the winter of 1871—72 the boy had "scarlet fever," and a few weeks later (six months before excision) the right eye "swelled up and got much larger," and was inflamed. From the inflammation and pain he was quite ill for a fortnight. Lately he had lost flesh and was somewhat thin when operated on but looked in other respects healthy.

The only family history of tumours to be obtained was to the effect that his mother had something in her nose which interfered with her breathing and occasionally bled. My informant told me that it was said not to be a polypus, but that it did not increase and that the woman had it for several years. She died at the age of 24, after some acute illness of only two days' duration.

134. *Melanotic Sarcoma, beginning in Lamina Fusca at region of Yellow Spot, passing outwards along the Course of the Scleral Blood-vessels, and producing a large Tumour outside the Eye, but none at all within the globe—Swelling of Disc and surrounding Retina, probably from pressure on Optic Nerve.*

Thomas Thomlinson, 10, Exthorp Villas South, Doncaster, æt. 45, was admitted under Mr. Hutchinson's care, January 12, 1872. At that time the right eye projected $\frac{1}{2}$ inch (12·5 mm.) in front of the eyebrow. There was much chemosis of the lower part of the conjunctiva. There was slight mobility of the globe in all directions. The cornea and iris looked normal, but the pupil, of medium size, only acted very slightly. There was no perception of light. The skin of the outer part of the lower lid was somewhat raised by a soft tumour which could be felt in the corresponding part of the orbit. A brief ophthalmoscopic examination of the disc showed great swelling of it and the surrounding retina; the veins were dilated and tortuous, and in a few places were slightly obscured. Three days later the chemosis had increased. Exploratory incisions were made into the tumour, with negative result. The globe was then excised and the tumour turned out with the finger; it was more or less broken up in the process, being very soft. It was quite black and probably when entire was equal in size to a large walnut. There was no difficulty in removing the tumour as it was enclosed in a thin capsule and was readily separable from surrounding parts. Portions of soft orbital tissue, some with melanotic nodules attached to them, were afterwards removed, and two-thirds of an inch (16·66 mm.) of the optic nerve was cut off; there was no evidence that any tissues at the back of the orbit were implicated. Chloride of zinc paste was then applied, and caused sloughing of the greater part of the soft orbital tissues with exfoliation of some fragments of bone.

History.—He first noticed the protrusion of his right eye about twelve months before excision and it had steadily increased up to the time of admission. The eye had, he said, been quite blind for about six weeks, and for a month or so before excision it had given him pain. A brother of the patient's father died of "cancer of the nose" at the age of 79, and a sister in the same family had a "tumour in the breast" which the patient believed "threw her into a consumption" of which she died at the age of 34.

The *black tumour* removed from the orbit was composed of round, oval and spindle-shaped cells, some pigmented, but a still larger number uncoloured. The round and oval ones were most numerous. Each cell contained a round or oval nucleus rather larger than a red blood-corpuscle.

On the outer surface of the sclerotic, at the region of the yellow spot, was a round patch of partly melanotic tissue from which the orbital tumour had grown. The eye was divided from behind forwards vertically and thin sections made through the choroid and sclerotic at the seat of origin of the tumour above-mentioned. The principal changes were:—1st, *great thickening of the outermost part of the choroid* (lamina fusca) by cells exactly resembling the normal elements of the part; 2nd, some of these pigmented spindle cells passed in branching groups almost to the inner surface of the chorio-capillaris; 3rd, the last-named layer of the choroid was much thickened, and contained scattered round, colourless cells, equal in diameter to one and a-half or two red blood-corpuscles; 4th, the capillaries and larger blood-vessels in all parts of the choroid were much dilated, the coats of the larger ones being a good deal thickened and showing here and there round, colourless corpuscles like those in the chorio-capillaris; 5th, from the thickened lamina fusca columns of large and small darkly pigmented cells could be seen lying in or close around the walls of the blood-vessels which pierced the sclerotic in that situation; one of these vessels, a large one, passed quite through to the outside of the sclerotic, being accompanied all the way by melanotic tissue which became continuous with the patch already described as forming the base of the orbital tumour; a direct continuity of structure was thus proved to exist between the starting point of development and the main seat of growth of the tumour. There was some thickening of the elastic lamina

over the region above described and it was covered with minute vitreous or "colloid" elevations not much larger than red blood-corpuscles.

It is to be noted that the greater part of the sclerotic itself at the yellow spot region was unaffected, only its outermost and loosest layers being infiltrated with patches of the sarcoma tissue; the proper tissue of the sclerotic is too dense to be opened up by such a growth unless the globe itself be first quite filled with it, and thus a distending force be added from within.

124. *Melanotic Sarcoma affecting a very large area of the Choroid —Ophthalmoscopic Examination four years before excision, sight having then been failing about one year—Total blindness for six months, and Glaucomatous Attack three weeks before excision.*

J. Abel, æt. about 45, under the care of Mr. Lawson. He lives at 10, Wellington Road, Stoke Newington, London. His left eye first began to fail in 1866, the symptom then present being a central scotoma. He was under Mr. Hulke's care for about three months in 1867 and the sight improved but was never restored. Later in the same year he became Mr. Lawson's patient and remained under care for nine months, taking bichloride of mercury. Mr. Lawson made the following note on the man's letter, in 1867: —"Choroiditis with exudation and incipient retinal detachment, V. 14 J." He ceased attendance for between three and four years, during which time the sight gradually failed; it was lost about six months before he again came under notice, on December 15, 1871. The following note was then made:—"Until the last three weeks has never had any pain, but then pain began at the root of the nose and afterwards spread to the circumorbital parts and the eye; it has been very severe. At present he has no perception of light with the eye. Cornea clear, not steamy, a.c. of good depth, iris blue-grey and looks healthy, pupil of ordinary size, lens transparent, T. + 3; a dull, greyish-pink reflex from fundus without ophthalmoscope." It was excised the same day.

The patient was seen 13 months afterwards and was then in good health, with no sign of a return in the orbit, and no enlarged glands in the neck.

The left eye was placed for about four hours in a 2 per cent.

solution of chromic acid to harden the sclerotic, and then divided vertically in the antero-posterior direction to the outer side of the optic nerve. At the inner and lower part of the eye a tumour was found springing from the choroid, and in contact by its most prominent part with the retina, which was detached in the usual umbrella form. On the retina itself were some patches of loose, white, granular matter, probably calcareous or fatty, and at the upper part just behind the lens it was of a deep, brownish-red colour, as if stained by the bloody fluid which filled the subretinal space and which contained well-formed blood corpuscles. The tumour grew from a nearly circular base, about an inch wide; the greatest thickness of the growth was about $\frac{1}{3}$ inch (8·3 mm.) thick. The growth being wide sloped off into the normal choroid around very gradually; indeed over a large part of the affected area an excessive pigmentation furnished the only means of distinguishing healthy from diseased choroid until a section was made. This diffused base of the tumour reached quite up to the edge of the optic disc on one side, but subsequent microscopical examination showed that it did not invade the nerve. In most parts the tumour was black but some whitish patches were noticed at various parts of its large area, and sections showed patches devoid of pigment near to and amongst the tissue of the sclerotic (its most intra-ocular layers only). A minute whitish spot, slightly elevated and like a small miliary tubercle, was noticed at a little distance from the highly pigmented area and surrounded by healthy choroid; when more hardened in alcohol sections were made of this; it appeared due to a considerable thickening of the chorio-capillaris by colourless tissue, apparently composed of narrow spindle-cells but not successfully isolated and proved to be such; it was certainly not composed of round cells; its surface was covered by normal epithelium. The large tumour itself was composed at its centre of beautifully formed spindle-cells; these were for the most part unpigmented, but were mixed with many small, coloured granules and large brown masses of oval, round and spindle-shaped cells; the spindle cells however formed by far the largest part of the tissue; they were rather small, and had long processes. A good many of the cells were pigmented, and there were also many masses of pigment of more or less spherical shape and varying much in size, scattered throughout the growth. The elastic lamina was considerably thickened

at the periphery of the base of the tumour. In a section taken at the confines of the growth, and including healthy choroid as well, the first change observed was thickening of the *deep* layer of the choroid by *highly pigmented* cells resembling those of the normal tissue, not by round, colourless cells; the chorio-capillaris in the same part was not altered. A little further on the pigmented cells became mingled with spindle-cells devoid of pigment; there was nothing requiring special mention in the vitreous, lens, or iris.

169. *Sarcoma of Choroid nearly filling Eye and causing pressure-ulceration of Cornea—History of five years' failure of Sight—No family history of Cancer.*

George Aggus, 50, a stout, florid gamekeeper, with nearly black hair, living at Barton Mills, Milden Hall, Suffolk, was admitted under Mr. Lawson's care, April 2, 1872. At that time there was a large, perforated ulcer of the left cornea, from whose base a granulation-like mass of considerable size projected. The history was that the sight began to fail five years before, from the temporal side, and became quite blind in twelve months. During that year he had no pain in it, only "a creeping sensation, as if something was alive between the skin and the flesh behind the ear." Soon after the sight was quite lost however he had a great deal of pain and inflammation in the eye, lasting six months. After that it remained nearly quiet, except now and then "when he caught a cold in it." The cornea appears to have been intact till about two months before excision, when after a drive on a cold day it inflamed and soon passed into the condition above described. The patient did not know of any family history of tumours or cancer; he had known all his four grandparents, and all his other relatives. There were no enlarged glands. The eye was excised at once and chloride of zinc paste applied to the orbit. In a fortnight a large slough came away, but there was some soft tissue still left in the orbit.

The eye, examined without hardening, was found to be nearly filled with a sooty, or rather slaty coloured *soft tumour springing from the choroid* by a circular base about $\frac{1}{3}$ inch (8·33 mm.) wide, at the lower and outer part, nearly corresponding to the insertion of the inferior oblique muscle. The edge of this base of

attachment was nowhere nearer than $\frac{1}{8}$ inch (3·12 mm.) to the optic disc, but *the surrounding choroid* as far as the disc, was uniformly and slightly thickened, and in sections exhibited abundant infiltration with round cells the size of white blood corpuscles, and with round or oval pigmented cells, some identical in size with the colourless ones, others a good deal larger. Precisely *similar cells* were found in great abundance between the bundles of fibres of the *optic nerve*, close to the eye; they were present *at the cut end* of the nerve attached to the eye. There were also small collections of them in the sclerotic, beneath the base of the tumour, but not bearing any apparent relation to the scleral blood-vessels. The vessels of the choroid were much dilated. The cell infiltration of the choroid was chiefly in the chorio-capillaris. In front the tumour was continuous with the mass which filled the corneal ulcer. There was a large clot of blood between the growth and the choroid at one part. In front of the equator both choroid and sclerotic were a good deal thinned, and uniformly bulging. There was no lens or retina.

The tumour consisted of cells having various elongated shapes, mingled with masses of pigment; the cells themselves were not seen to contain any pigment, but no prolonged search was made.

When discharged, about a month after the operation, there were no enlarged glands and no local return. Six months and a half after the operation, in answer to an enquiry as to return of the growth, &c., he wrote that he was "perfectly well, and had been so ever since the operation, not having had the least pain."

*135. *Unpigmented Sarcoma (probably of Choroid) originating in an Eye which had been Blind and shrunken for many years—The tumour passing through the Sclerotic, producing a large extra-ocular growth and infiltration of the Optic Nerve near the Eye—No return after ten months; patient an old man.*

This patient was an old gentleman aged 78, and I am indebted to Mr. Streatfeild, under whose care he was in private,

* To prevent this case being multiplied into two it should be stated that it was alluded to by Mr. Lawson in a paper on "A Cancerous Tumour originating in an Eye which had been long lost from some Inflammatory Affection," in Vol. vii, Part 3 of the "Ophth. Hosp. Reports," p. 285. It is there stated by a mistake for which I am answerable, that the patient had been in the Moorfields Hospital.

for the opportunity of examining the specimen. His history extended back to 13 years before excision, when his right eye became blind after some apparently spontaneous inflammatory attack, and soon became shrunken and quiet. About this time he consulted Mr. Bowman who did not think it advisable to remove the eye at that time. About two years and a half before excision he saw Mr. Hutchinson who thought excision unnecessary as the eye still remained quiet and shrunken. When he came to Mr. Streatfeild on January 13, 1872, he said that he had noticed the growth for only three weeks, but this probably only marked the date of its protrusion from between the lids. The right eye was at the above date pushed downwards and outwards beneath the lower lid; it was much shrunken. From between the lids a tumour protruded, which however seemed chiefly to occupy the upper and inner part of the orbit. An old lady, cousin of this patient, was suffering at the same time from a tumour behind her lower jaw, which was thought by her surgeon to be cancerous.

The eye was excised January 13th, the optic nerve being divided more than an inch from the eye. The whole mass removed was as large as a small hen's egg, and consisted of a tolerably firm, somewhat lobulated tumour, covered on its anterior part by the puckered remains of the cornea and part of the sclerotic, the latter tunic not being traceable for more than a short distance over the surface of the tumour From the hinder end of the mass the *optic nerve* emerged; its proximal end looked healthy to the naked eye, its sheath at that part being quite loose and not at all thickened, but a considerable length of the anterior part of the nerve was much thickened and glued to its sheath, the whole structure at this part being almost indistinguishable, except in size, from the mass of the tumour. The cut surface of the growth was of a whitish pink colour, with occasional patches and streaks of rusty colour and a single island of darkly pigmented tissue near the front; at its most prominent part behind was a cyst about as large as a pea. The morbid growth consisted almost entirely of spindle-shaped cells of large size and quite devoid of pigment, the most highly coloured patches being due to irregular granules derived from blood extravasations.

The seat of origin of the tumour could not be made out with

any certainty, but the probability is that it sprung from the choroid. The choroid itself was but very imperfectly represented by a pigmented line within the sclerotic; at one part it, or the ciliary body, formed an irregular pigmented mass continuous with the growth which filled the eye and possibly marking its origin, or perhaps formed by the shrinking together of the choroid when the lens, &c., escaped.

I learn from Mr. Streatfeild that ten months after the operation this patient was in good health and showed no signs of local return of the disease.

88. *Sarcoma of Choroid filling about half the Globe, but not extending outside it—Glaucomatous symptoms at time of Excision—History of previous Glaucomatous symptoms for which first Iridectomy and then Paracentesis had been done.*

William Allen, æt. 54, a sailor living at 6, Jackson's Buildings, Hull, applied to Mr. Lawson, on September 9, 1871, on account of his left eye. The ordinary symptoms of glaucoma were present, with pain and congestion; there was no perception of light. Two operations had been done elsewhere, one an iridectomy and the other from his account probably paracentesis. The fundus could not be illuminated and the conjecture that there was a tumour in the eye could not therefore be proved. The eye was removed the same day and was examined eleven days later, after being hardened. A soft tumour as large as a cherry was found attached by a base about $\frac{1}{3}$ inch (8·33 mm.) wide to the choroid, occupying the posterior part of the eye and coming to within $\frac{1}{8}$ inch (3·12 mm.) of the optic disc. There was a constriction a little above the base of the tumour, beyond which it again expanded into a rounded head.

The *retina* was detached except at the optic disc and ora serrata, and its opposite inner surfaces closely applied to each other in most parts, so that there was scarcely any vitreous remaining, except a little at the front. The sub-retinal space was full of fluid blood where not occupied by the tumour. There was no trace of *lens* (had it been extracted at the former operation, when iridectomy was done?). The *tumour* was very soft at its rounded apex, and on section this part was reddish-brown and

contained much blood in several cyst-like cavities. Its base was firmer and nearly white. It was composed entirely of cells; some were spindle-shaped, others had three or more processes like the stroma-cells of the choroid, others were oat-shaped and oval. None of them contained pigment, the brownish-red colour of the softer parts being due entirely to free irregular pigment granules of rusty colour derived from blood. There were many free, round, and oval nuclei which had doubtless escaped from the cells among which they lay.

I have not succeeded in ascertaining the state of this man's health since he left the Hospital.

85. *Malignant Tumour growing from frontal bone into orbit—Very long period of quiescence followed finally by rapid growth of the tumour and death—Exploratory Puncture for confirmation of Diagnosis—Eye pushed out by Tumour, and excised on account of acute Inflammation.*

Peter F., æt. 45, came under Mr. Bowman's care on Sept. 5, 1871, with proptosis of his left eye caused by a hard, apparently bony, growth with broad diffused base, attached to the outer and upper part of the roof of the left orbit, and passing back into the cavity and upwards above the brow for about $\frac{1}{2}$ inch. In front it reached to the margin of the orbit, but its hinder limits could not be defined. He stated that the eye had begun to project seven years before and that the prominence had gradually increased. There had never been any pain till two months before admission, and it was only since that time that the sight of the left eye had been failing; at the time of admission its vision was reduced to perception of fingers. The pain had latterly been very severe. Four days later there was hypopyon, tenderness on pressure, great chemosis, + tension, and only bare perception of light. The eye was accordingly excised by Mr. Wells, and the man was discharged a few days later, it not being thought practicable to attempt the removal of the tumour. Nothing was found in the eye which threw any light on the orbital tumour; acute iritis and commencing inflammation of vitreous being the principal changes.

Nothing more was heard of the patient till February 9, 1872,

when he came again because the tumour had grown. It had increased greatly in size since his first visit, five months before. It was now firm, but less hard than it had been when smaller. On questioning the patient—a very intelligent man from Macclesfield—no history could be obtained of cancer or any tumours in any of his relatives, most of whom were known to him; he himself believed that he had never had syphilis. At this date Mr. Bowman removed a small cylindrical piece of the tumour with a trephine; it was whitish and tolerably firm, and was found to consist chiefly of large cells intersected by a few bands of normal connective tissue. The cells were for the most part round or roundly oval, but some approached to the spindle-shape. No section could be made, and so the arrangement of the elements of the tumour was not satisfactorily made out, but there were indications in some fragments of an alveolar structure, the peripheral cells of the groups being spindle-shaped or oval and the central ones round. The patient was not seen again, but his wife wrote to say that he died on July 27th with a very large tumour; "where his left eye should have been was one mass of putrifying flesh, which stood out on a level with his nose," and "his brow on the left side was much swollen." About a fortnight before his death an abscess formed in his left thigh, but nothing was said about secondary tumours, either on the medical certificate of death or by the wife.

MISCELLANEOUS.

147. *Chronic Irido-Cyclitis, ending in complete Blindness of one Eye—Slight Iritis of other—No cause assignable—Patient a young woman.—Anatomical Changes; Plastic Inflammation of Iris and Ciliary Body extending to Hyaloid—Retinitis with very great Elongation of Bacillary Layer and some Hypertrophy of Müller's Fibres.*

This specimen was of unusual interest, both from a pathological and clinical point of view. The peculiar changes in the bacillary layer of the retina, to be described presently, were such as I had not seen before, although Dr. Hermann Pagenstecher had shown me only a few weeks previously a drawing of a similar change. Clinically the case was a puzzle. I could not get any clue to the cause of the girl's iritis, either in her own state of health or in her family history. The most careful questioning elicited

no history of symptoms in the least suspicious of syphilis acquired from any source, and there were no signs whatever of inherited syphilitic taint. Her family was not gouty, so far as she and her mother (an intelligent Scotch woman) knew; her father, an upholsterer 50 years old, had however recently had slight rheumatism in one shoulder. She had been vaccinated a short time before the defect of sight was first discovered, and in the absence of any other ascertainable cause, it is perhaps allowable to ask whether vaccinia, even when modified by a previous attack as her's probably was, may not occasionally have iridocyclitis for one of its consequences, as is well known to be the case with variola.

Flora C. was admitted under Mr. Couper's care at the end of March, 1871, with symmetrical iritis. The right eye was the worse, vision with the left being nearly perfect and the patient herself not knowing that anything was amiss with this eye until the action of atropine showed a well-marked synechia. She attended at rather long intervals for nearly a year. In February, 1872, it was noted that with the right eye she had no perception of light; the cornea was clear; the iris yellowish-grey; the anterior chamber shallow; the pupil small, irregular and excluded, and its area white. With the left eye she could see $\frac{20}{30}$ and the iritis had not progressed. The right eye was excised Feb. 13, 1872. In December of the same year I examined the left eye again: it was just as before in all respects. The iritis had not advanced, the fundus was normal and V. good.

She is a well-grown girl with constantly very florid cheeks and red hands due to sluggish circulation; she is liable to bad chilblains. In all other respects she looks and professes herself to be in excellent health and says that she always has been so. In the early part of 1871 (late in February or early in March) she found quite accidentally that she could not see well with her right eye. A short time (a week or two) before this she had had several "styes" on the eyelids of the same eye, but with this exception she was not aware of having had any inflammation about the eye and had not at any time had the slightest pain in it until a few days before excision. As previously stated she did not know that there was anything the matter with the left eye, but atropine revealed the presence of a single well-marked adhesion. None of her friends had noticed any redness or unusual appear-

ance about her eyes at any time. She had never had any symptoms of gout or rheumatism. About two years before she discovered the defect of sight she had an eruption of "boils" on her arms; from her account it did not sound like a secondary syphilide, and this suspicion was further negatived by her assertion (afterwards confirmed by her mother) that many persons in the village (she lives in the country) had a similar eruption about the same time. She was vaccinated in January or February, 1871 (*i.e.*, probably a few weeks before discovering the defect of sight), but she could not remember the exact date. She believes the vaccination "took well" but was unable to identify the scars, or to tell me which were recent and which the results of vaccination in infancy. No unusual symptoms, either syphilitic or otherwise, followed the vaccination. It should be stated that while under Mr. Couper's care she took iodide of potassium and used atropine and blisters.

The right eye was hardened for eleven days in chromic acid and then divided vertically in the antero-posterior direction. It appeared rather small, but this may have been due to hypermetropia, not to shrinking. The *anterior chamber* contained firmly coagulated matter consisting of rather highly refracting bodies of about the size of pus-corpuscles, but more or less angular and some with short processes; these were probably altered albuminous matter; there were also a few red blood-corpuscles. The *vitreous* was highly inflamed in front, where it showed many opaque threads consisting of large multipolar cells with long branching processes, and of fine, sharply defined, anastomosing fibres (probably chromatised fibrin). The posterior part of the vitreous was normal as far as naked-eye appearances were concerned. The *retina* looked too thick near the disc, but there were no signs of other changes in it, or in any of the remaining parts of the eye, until microscopically examined. It then showed a very remarkable change in the layer of *rods and cones*. This stratum was much increased in thickness by elongation of its constituents, so that it equalled in the most marked specimens, which were near the disc, three times its normal thickness. The bulbous portion of the cones was also considerably swollen, except just at their point of junction with their cone-granules; in this situation there was often a constriction, as if the cone had been slightly drawn away from the granule and a narrow neck had been thus pro-

duced. The "cone" was thus often more or less spindle-shaped. The chief change however appeared to consist in an elongation of the outer end of each rod or cone into a fine fibre, with a slightly bulbous extremity and often one or more fusiform swellings in its course, and resembling the normal structure in refraction and other microscopical characters. When the change was further advanced the terminal swelling became a round vesicular nob, with highly refracting myeline-like outline, which frequently became detached and lay loose among the surrounding filaments. The outer ends of the very elongated rods and cones also split into several short branches, each of which was often more or less nodulated, and between which the above-mentioned nobs or globules lay, or from the swelling of which they were very likely formed. The whole bacillar layer when in this state bore some resemblance to a number of thin-stemmed plants crowded with small terminal branches and buds. These changes were present in nearly all parts of the retina, but not everywhere in an equal degree; they were most advanced near the disc, about the equator and in the neighbourhood of the ora serrata; while at and to the temporal side of the yellow spot they were only just beginning. Close to the optic disc an atrophic change seemed to have begun in the overgrown bacillary layer; its elements had become adherent to each other, and formed irregular, highly refracting, fibrous columns with large oval and circular spaces between them. Close to the disc there were also deposits of large, round, faintly granular corpuscles in the outer granule layer of the retina, and in the same situation there was a moderate œdema of the inter-granule layer giving rise to oval and fusiform spaces between the bundles of Müller's fibres. There were also changes in the choroidal epithelium close to the edge of the disc, where it was somewhat heaped up, probably from proliferation; but there were no visible alterations in the other choroidal structures there or further from the disc (no sections were examined, however, further than $\frac{1}{8}$ inch (3·12 mm.) from the disc). There was diffuse infiltration of inflammatory cells into the hyaloid covering the optic disc. In all parts of the retina the connecting fibres (Müller's fibres) were more or less lengthened, as well as the bacillary layer, so that everywhere the retina was too thick; the columnar cells forming the *pars ciliaris retinæ* were also much increased in length and set more nearly perpendicular than is usual. The *iris and*

ciliary processes were highly inflamed, being swollen by infiltration with crowds of lymphoid cells; in the iris these formed prominent nodules of vascular embryonic tissue, situated sometimes near its pupillary border and sometimes near the ciliary attachment, but not in the intervening parts. The pigmented epithelial layer of the ciliary processes and its overlying cells derived from the ciliary retina was generally intact, but in a few places the cell-growth beneath had burst through into the tissue of the suspensory ligament and formed minute circumscribed collections (true microscopic abscesses) in that tissue. There was also diffuse cell-infiltration of the *hyaloid and suspensory ligament* covering the whole of the ciliary body, and a few round cells were seen in the ciliary part of the retina near the ora serrata. In the *sclerotic*, over the ciliary muscle, were a few rather large circumscribed cell-deposits between its bundles of fibres. The cell-infiltration of the uveal tract had not invaded the *ciliary muscle*, except quite in front where it became continuous with the inflamed iris; the morbid change, so far as deposit of new cells was concerned, was limited to the iris and the ciliary processes, and stopped almost abruptly at the position of Schlemm's canal. There was, however, *œdema of the ciliary muscle*, its bundles being here and there separated by highly refracting substance, probably coagulated albumen, with an occasional corpuscle. The *cornea* was healthy in minute structure. The *lens* showed signs of œdema and probably of cell proliferation; there was a homogeneous structureless layer (coagulated effusion) beneath both anterior and posterior capsules, but disappearing at the equator; the lenticular epithelium was represented by a number of beautifully egg-shaped, large, highly refracting, cell-like bodies, some nucleated others quite homogeneous; they were probably swollen epithelial cells. In the superficial layers of the lens there were many oval nuclei, some large but most of small size and granular. They appeared to be much more numerous than the normal nuclei of the lens-fibres from which they were probably derived; they were most numerous (as are the normal nuclei) at the equator. In various parts there were large globular masses like myeline derived from swollen and ruptured lens-fibres.

108. *Irido-choroiditis beginning at almost same time in both eyes and steadily getting worse—In one eye the attack followed by Secondary Cataract, which was extracted—Subsequent shrinking of the Globe, with great thickening, in patches, of the outer layers of Retina, and epithelial disturbances of Choroid—Iridectomy in other for Artificial Pupil—Preservation of some Sight—Rheumatic nature of the Disease—Mother of Patient Rheumatic.*

The left eye of Kate H., æt. 25, excised by Mr. Couper, Nov. 3, 1871. The history of the patient from whom this eye was removed is very curious, from the difficulty of assigning any cause for the destructive changes which occurred in her eyes. The specimen itself shows an unusual change in the retina, but in other respects it does not throw much light on the nature of the malady.

The patient was a robust country girl with dark hair and blue irides, living in Hampshire. She was, when seen, and had always been, in good health. There appeared no reason to suspect syphilis, either acquired or inherited, but direct questions as to the acquired disease were not asked. Catamenia had always been regular. About five years before she came to the Hospital her left eye inflamed, with some pain, and about a fortnight later the right was similarly affected. From that time they steadily got worse, never improving in the least. Excepting at the beginning of the attack she suffered very little pain.

She herself had never had any arthritic symptoms whatever, either in joints, fascia, or in connection with nerve-branches. Her mother was stated to suffer much from chronic rheumatism in the hips and in other joints; "her hips often give out with pain;" she "often has rheumatics badly all over her head." Many of her joints were stated to become swelled and painful at times; she had been for many years very deaf. There was no other arthritic history known in any of the patient's brothers, sisters, uncles, or aunts.

The patient came up to the Hospital three months before the left eye was excised. Soon after admission the opaque lens was extracted from the left, and iridectomy upwards was done in the right, the pupil being quite occluded by a thin membrane. At the time of excision (three months after the above operations)

the left eye was soft and much shrunken, the cornea being still clear. The right was also soft but not obviously shrunken; cornea clear; a good upward artificial pupil. With it she could see large objects. There was no congestion or tenderness.

The principal changes found on dissection of the much shrunken left eye were a thickened and contracted state of the part of *iris* which remained; abundance of opaque white inflammatory tissue lining the inner surface of the *ciliary body;* a stringy, tough, but clear *vitreous;* the *retina* probably nowhere in accurate contact with the choroid, was slightly lifted from it by numerous large elevations on its own outer surface, and there were *old choroidal changes.* By *microscopical examination* of the *vitreous* I failed to detect in it any blood-vessels. The *retina*, examined fresh without hardening the eye, was semi-transparent and not much if at all stiffened; from its outer surface projected several opaque white prominences, tolerably well circumscribed and of considerable size, the largest being about the size of a hemp-seed. When hardened and examined in section, these lumps proved to consist simply of the much thickened connective tissue of the retina, especially the vertical portion of it; there was not, however, any separation of the overgrown tissue into bundles or pillars with clear interspaces. Sections of the retina in parts not apparently diseased showed considerable thickening of its whole structure by the same change; the rods and cones were absent altogether. There were many small spots of adhesion between retina and choroid. The *epithelium of the choroid* showed many minute fissures and spots of deficiency invisible to the unaided eye, and also a few round spots of deficiency just visible without magnifying through which the thin stroma and the sclerotic could be seen. The epithelial cells themselves were often enlarged and round; sometimes the nucleus was enlarged. There was no colloid degeneration of the choroid. No trace of lens.

61. *Chronic Irido-Choroiditis in one Eye, leading to Blindness—Iritis in other Eye—History imperfect, and cause of Eye Disease not ascertained—Last Eye excised after being blind several years—Thick layer of Fibrous Tissue (containing Cholestearine) within Choroid, and Diaphragm of same across Hyaloid Fossa—Detachment of Retina—Atrophy of Choroid, with Cell-Infiltration of Chorio-Capillaris—Fluid Chalky Cataract.*

Maria N., æt. 60, left eye excised by Mr. Lawson, July 18, 1871. The history is unfortunately very defective, the only facts being that she had attended the hospital at intervals, since 1866, the diagnosis originally made in 1866 being blindness from irido-choroiditis in the left eye, and chronic iritis in the right. At date of excision the left eye was somewhat shrunken, cornea clear, pupil white as if occupied by chalky lens. Examined directly after excision it was found that the *lens* was converted into a milky fluid, the opacity of which was due to spherical, calcareous globules, dissolving with effervescence in nitric acid, and leaving a granular, cloudy matter behind. The iris was in contact with the cornea. There was detachment and thickening of the *retina*, and only a drop or two of clear, viscid vitreous remained. On the inner surface of the *choroid*, and perforated by the optic nerve, was a thick, cup-shaped *layer of firm white tissue*, feeling like cartilage. It extended forwards to the ora serrata, where it joined a diaphragm of similar tissue which stretched across the eye just behind the posterior lens-capsule. This tissue contained no bone nor cartilage; it consisted entirely of fibrous tissue, not unlike that of tendon but less wavy. There were many little collections of cholestearine in its substance, recognisable by the microscope and also as minute yellowish dots by the naked eye. The outer surface of this new tissue was somewhat tuberculated in correspondence with depressions in the choroid and sclerotic. The *choroid* itself showed signs of atrophy in the complete absence of its epithelium, thickening (without colloid disease) of the elastic lamina and partial atrophy of its stroma; while the existence of chronic inflammation was shown by the infiltration of small round cells into the chorio-capillaris, and the occurrence of globules and hour-glass masses of deposit, like those found in the pineal gland and choroid plexuses of the brain (probably calcareous).

227. *Small Abscess without known cause between Sclerotic and Choroid, causing three months' attack of Inflammation—Eye then quiet for nearly eleven years; excision for relapse of pain—Circumscribed collection of Cheesy Pus between Choroid and Sclerotic, surrounded by much fibrous thickening—Retina partly detached—Eye shrunk.*

John D., æt. 44, was admitted August 6, 1872. His right eye was quite blind, considerably shrunken, and very soft. The cornea looked healthy, the iris was greenish-blue, the pupil small, probably excluded, and its area white. The eye had been painful for about a week and that was his reason for coming. The left eye was perfect and had never ailed anything. He said that the right eye had inflamed 11 years before, without any cause that he knew of except "a cold." The attack lasted three months and was attended by great pain and redness; "the eye was like raw beef." The attack began in the month of January, and ended in permanent blindness. The eye had never troubled him since then until he came to the hospital. He gave no history of primary syphilis, or of subsequent syphilitic symptoms, nor was there any arthritic history in himself or his relatives. He was a shoemaker, and had always enjoyed good health.

The eye was excised by Mr. Critchett on August 6, 1872, and hardened in Müller's fluid for two and a half months. At the outer part of the eye, nearly corresponding to the insertion of the inferior oblique muscle, a small perfectly *circumscribed collection of cheesy matter* was found within the sclerotic; it was about as large as a hemp-seed. It was situated in the midst of a thick large patch of tough fibrous tissue, consisting of sclerotic, choroid and retina fused into one and much thickened by new tissue; the pigment line of the choroid at this patch was very irregular and often quite lost, and it was therefore impossible to be quite sure whether the abscess was external or internal to the choroid, but it seemed on the whole more likely to be external so far as could be seen. The mass of cheesy matter consisted of degenerated pus-corpuscles and oil-globules. The retina elsewhere was detached in the usual manner. The lens was calcareous and fluid. There was extensive "colloid" disease of the posterior half of the choroid, the growths being very small and not disturbing the epithelium. The sclerotic was everywhere thickened, but much more so on the side corresponding to the abscess.

146. *Cholestearine passing into Anterior Chamber by aperture in Suspensory Ligament and Retina leading from the Subretinal Space, in which much of it was present—Patient liable to Sick Headaches, &c.*

Priscilla P., 33, married, lost the sight of her left eye gradually in about two or three years, and it had been quite blind for seven years at time of excision. The chief peculiarities at the latter date were an abundant deposit of sparkling cholestearine crystals on the back of the cornea, and a shining golden lustre from the lens due to the same cause. She knew of no cause for the failure, and could only say that it had been accompanied by occasional severe pain. The eye was removed February 12, 1872, because it had begun to induce sympathetic irritability and occasional dimness of the other. Old *detachment of the retina* was found extending even to separation of the ciliary part. There was old fibrous tissue on the inner surface of the *ciliary body*, and in this layer was a circular hole as large as a large pin's head, with rounded smooth edges and evidently of old date, through which the contents of the subretinal space communicated with the anterior chamber by the side of the lens, the suspensory ligament being absent at the same part. There was a very large quantity of cholestearine in the subretinal space, and this could easily be made to pass backwards and forwards into the anterior chamber. The lens was full of cholestearine.

This patient was subject to bad sick headaches and vomiting, but she had never had jaundice; she was sallow, had black hair, and blue iris.

231. *Cataracts in Childhood associated with craggy teeth and small stature—Symmetrical Keratitis of doubtful nature—History that patient took much mercury in infancy—Query: May the mercury have influenced the development of his lenses and of his teeth?—No history or signs of Hereditary Syphilis—No family history of Infantile Cataracts, or Bad Sight—One Eye Lost after operations with Needles and Syringe; good result in the other Eye after use of needles only—Changes in the Lost Eye—Iritis—Ciliary Processes dragged forwards—Retina Detached and shrunken, a diaphragm of new fibrous tissue stretching across Eye behind Lens-capsule—Altered Blood in Subretinal Space.*

The right eye of Robert S., 22, Mr. Streatfeild's patient. It

was excised for inflammation and loss of sight, following operations for cataract (? congenital). The case is of interest, because it was his mother's impression that the craggy and dwarfed condition of his second set of teeth had been caused by his taking many "gray powders" in infancy for "fits," and the question arises whether infantile cataract, which is so commonly associated with rough craggy permanent teeth, may also sometimes be due to the long-continued exhibition of mercury in early childhood.* In the present case the patient had (according to his mother's statement) many gray powders at intervals during a considerable period of his infancy, while he was subject to convulsions, but she did not remember that the medicine appeared to injure his health in any way at the time. There is no history of symptoms of infantile syphilis. He is at present of small frame and has a pale, earthy complexion, but shows no signs of hereditary syphilis. His teeth (incisors and most of the molars and bicuspids) are short, narrow, discoloured and very craggy, but not notched. At the age of 13 he came to the hospital with double "keratitis," but there are no notes on the paper explanatory of its precise nature. At that time it was noted on his paper that he also had cataracts. He says that when quite young he could see well and believes he could read the finest print as well as other children, so that his cataracts were probably not congenital; the corneal affection got well in about a month and never relapsed. Eight years later (March, 1871) Mr. Streatfeild began to treat the cataracts. In the right eye he used, first a needle; second (a month later) the syringe; third (after another month's interval), a needle again. A few days after the third operation the eye inflamed; it got better and relapsed several times, losing more sight each time, and finally losing all perception of light about three months before excision on August 12, 1872. On the other eye four needle operations (but no suction) were done, with an excellent result. The eye was examined, after having been for two months in Müller's fluid and then divided vertically in the antero-posterior direction. There was detachment and great contraction of the *retina*, the *vitreous* chamber being represented only by a

* I believe I have heard Mr. Hutchinson suggest the possibility that the development of the lens may sometimes be influenced by mercury given in childhood, and infantile cataract be thus caused, and I may unconsciously have borrowed the idea from him.

small central tube containing gelatinised albuminous matter. The anterior part of the retina was in the form of a flat plate attached by its edge to the ora serrata; the posterior part formed a tubular pillar attached behind to the disc and in front to the centre of the aforesaid flat plate behind the lens. The *lens-capsule* was thin, nearly transparent and adherent to the pupillary edge of the iris. The *ciliary processes* were dragged inwards (towards the ocular axis) somewhat, and the lens-area* thus diminished. Attached to the hinder part of the ciliary body, just in front of the ora serrata, was a complete *diaphragm of tough, white, glistening, fibrous tissue*, thickest at its centre and everywhere closely adherent to the front (disc-shaped portion) of the retina. Some parts of it were united with the lens-capsule, but in most places there was a considerable interval between them. The part of the ciliary body to which the periphery of this diaphragm was fixed had become drawn forwards and inwards, so that in section it closely resembled a second ciliary process. The *subretinal space* was full of old blood, separated into semi-opaque gelatinized serum and pale buff coloured clot. The clot contained red blood-corpuscles in various stages of degeneration, and some still well-formed; also many corpuscles of considerable size composed of large, highly refracting granules (? calcareous or fatty), and a few single, needle-shaped crystals, perhaps hæmatoidin. The patient is one of a family of two; his sister is reported to have good sight, and there is no family history of infantile cataract.

97. *Eye lost after Extraction of Cataract—Detachment of Choroid from Sclerotic and of Retina from Choroid by Fibrinous and Albuminous Matter, probably decolorised Blood.*

The right eye of Sarah M., æt. 58, Mr. Lawson's patient. Cataract was extracted by the modified linear operation on July 21, 1871. Two or three days later it began to pain her, and continued very painful for nine weeks. It then became comparatively quiet. At the date of excision, October 7, 1871 (two months and a half after the cataract operation), the eye was shrunken and soft. There was not then any pain but it had hurt her somewhat a

* By "lens-area" I mean the area enclosed by the ciliary processes and normally occupied by the lens. It is an awkward phrase, but I know of none shorter and more expressive.

few days before. No sympathetic irritation of the other eye, which also contained a senile cataract, had occurred.

Hardened for two months in chromic acid. There was detachment and shrinking of *retina* and total absence of *vitreous*. The *choroid* and *ciliary body* also were detached from the sclerotic from a short distance behind the equator forwards as far as the attachment of the ligamentatum pectinatum iridis, except at the upper part where the operation wound had been made, and there the ciliary body still adhered to the sclerotic. In the subchoroidal space there was a quantity of tough fibrous material composed of straight highly refracting fibres, in which no nuclei were seen, mixed with granular matter and other forms of coagulated albuminous matter from the blood. Similar matter, but without the straight fibres, occupied the subretinal space and anterior chamber. Probably all these substances were derived from blood, the straight highly refracting fibres being altered fibrin and not an inflammatory new tissue.

187. *Vascular Cord traversing Vitreous and co-existing with great Plastic Inflammation of Hyaloid and minor alterations in Retina and Choroid—Formation of Connective Tissue beneath anterior Lens-capsule—Elongation of Rods and Cones—Effusion between Choroid and Retina—These changes occurring in an ill-grown weakly child, born prematurely—The Vascular Cord in Vitreous probably a thickened persistent Hyaloid Artery—The other changes most likely secondary to it.*

Emma G., æt. 5 years at the time when her left was excised, was first brought to Mr. Hutchinson when about æt. 2 years, and the same operation was then advised, but declined; probably therefore, the changes in the eye did not advance very quickly. At the date of excision the pupil was circular and dilated, the lens probably transparent, while a yellowish patchy reflection came from the back of the eye when examined without a mirror or lens; no vessels could be seen on the opacity by concentrated light. The cornea was steamy and the globe appeared slightly enlarged though only very slightly congested. It was supposed at the first visit, three years before, that the eye probably contained a cancerous growth, and the same diagnosis appeared more likely than any other to be true at the date of excision on May 6, 1872.

History.—The patient is the fifth in a family of eight. Neither she nor any of the others appear to have had any symptoms of hereditary syphilis, and she shows no signs of it. She was born prematurely, the mother believes at eight months, and was very small and weak as a baby. At about six months she had measles and the attack left her very weak and out of health. It was at about this time that her mother first noticed "the black of the eye turn colour." There is no history of pain in the eye, and the mother does not know when it began to enlarge. The child is still (January, 1873) very puny and ill-grown; her forehead is large and prominent, with thin skin and large veins (? slight hydrocephalus), while the face is disproportionately small. She is fairly intelligent. She presents no congenital defects or monstrosities. Two of the other children are said to have been weak and small in infancy, and the father is very "delicate." No other clue can be obtained as to the cause of the state of the eye, and in view of the generally backward condition of the child's bodily development it seems probable that the inflammatory process which destroyed the eye was the result of persistence of the fœtal hyaloid artery and the supervention of nutritive changes, primarily in the parts supplied by it and afterwards in other structures. I regret that I omitted to examine the other eye with the ophthalmoscope; she can, however, see well with it.

The eye was excised May 6, 1872: after excision it transmitted light well. The globe was elongated. The *optic nerve* outside the eye was much atrophied. It was kept in Müller's fluid five months, and was then moderately hard and was divided equatorially. The *anterior chamber* was deep and the *posterior* much enlarged, thus accounting for the elongation; both contained material like that which filled the *vitreous chamber*, a soft, brittle, gelatinous substance like bad calves'-feet jelly, and microscopically showing nothing but a finely molecular appearance; no doubt this substance was albuminous. The *iris* and *lens* looked healthy. On washing out part of the altered vitreous, the chamber was found to be crossed by two fine tough threads, which were attached behind about $\frac{1}{10}$ inch (2·5 mm.) to the inner side of the optic disc, and in front to about the middle of the back of the lens-capsule. They were stiff and quite distinct from the surrounding vitreous which had just the same microscopical characters close to them as elsewhere. One of them, the larger,

was as thick as stout sewing thread, the other very much thinner; they were close together, and spread out at each end into a sort of foot.

There were many other more or less tough strings in the foremost part of the vitreous, close to the back of the lens, and two of these stretched backwards for a short distance and were again attached at their opposite ends, thus bridging over a small arc of the ocular curve, but the rest were attached only at one end. These latter were found to consist of connective tissue elements in various stages, round cells, spindle-shaped cells, and long fine highly-refracting fibres looking like elastic tissue but not curling up when broken, and each with an oval nucleus. There was also here much rust-coloured pigment, in masses like compound granule corpuscles. The *retina* was *in situ* and everywhere much and irregularly thickened, at least it appeared to be so while the hyaloid remained in normal position, but probably much of the change was due to the latter membrane, for the optic disc could not be recognized being probably bridged over by thickened hyaloid. The *iris* appeared normal to the naked eye and was not adherent to the lens-capsule ; it was, on the other hand, separated from the lens by a considerable depth of structureless coagulated translucent substance. Sections of the iris showed no appreciable thickening of its substance, but a rather doubtful increase of its nuclear or corpuscular elements.

Microscopical Examination.—The larger of the two cords crossing the vitreous contained two large blood-vessels which ran through its whole length. At the back of the lens they divided into branches which could be traced only a short distance, and whose mode of ending could not be ascertained. They took origin from one or more of the large retinal vessels near the expanded base of the cord. The smaller cord contained no visible blood-vessel. The cords were composed of a finely fibrous structure arranged in a reticular manner, each of its meshes containing a round or oval corpuscle. The peripheral parts of the cord were more fibrous and contained fewer and smaller meshes than the part surrounding the blood-vessels. In front the two cords expanded and passed into a fibrous structure at the back of the lens (thickened hyaloid), which was continuous at the circumference with the similarly altered hyaloid covering the ciliary body. The change above men-

tioned which to the naked eye appeared due to general thickening of the retina was proved microscopically to be caused by enormous thickening of the *hyaloid* and conversion of this membrane into a reticulated fibrous tissue with small meshes, each filled by a finely granular corpuscle. This new tissue varied much in thickness, being sometimes twice as thick as the retina and sometimes quite thin; it was thickest near the retinal origin of the vascular cords traversing the vitreous, with which indeed it was continuous. Its innermost (vitreous) layers were distinctly fibrous and arranged more or less parallel to the nerve-fibre layer, this part of the thickened hyaloid being continuous with the cortical part of the vascular cords. In its deeper (retinal) parts the meshes were more or less circular, and composed of substance which refracted light more strongly than the superficial layers. The thicker parts of the new tissue contained comparatively few blood-vessels (excepting just at the base of the vascular cords, where there were many large ones), but in some parts where it formed only a thin layer on the inner surface of the retina many vessels of considerable size were seen imbedded in an almost hyaline matrix containing thinly scattered oval and round nuclei. The *retina* showed great alterations of its most vascular parts, and comparatively trivial changes in its outermost layers. The *limitans interna* could be recognized in many parts but was generally indistinguishable where the new (hyaloid) tissue was thickest. No *nerve-cells* were visible; only a thin fibrous layer was present to represent the *nerve-fibres*, and even this was not always present. The whole retina had somewhat the appearance presented by the reticular hyaloid tissue above described, its interstitial fibrous framework being thickened and converted into highly refracting meshes. The stratification was fairly preserved in some parts, but quite destroyed where the change had gone further; nowhere were the vertical fibres of Müller visible. The rod and cone granules of the *outer granule layer* could not be distinguished by size or refraction from the connective tissue nuclei of the same part. There was no change of the *outer limiting membrane*. In the *bacillar* layer there were various alterations; in some parts it was normal, but in most sections one or other of the following changes were present:—lengthening of the outer halves of the rods and cones with the formation of minute terminal clubs (this

increased lengthening was nowhere excessive); swelling of the inner (bulbous) ends of the cones into wide ovals or even spheres; adhesion of pigment granules from the choroidal epithelium to the apices of the rods and cones, and its passage for a short distance inwards between them (this adhesion did not occur at any parts where the rods and cones were of normal dimensions); effusion of a layer of structureless substance between the pigment granules adherent to the rods and cones and the remaining parts of the choroidal epithelial cells (this layer was sometimes equal to or greater than the thickness of the bacillary layer); atrophy of the rods and cones more or less complete, passing through a stage in which they were represented by short irregularly bent rods with large globular interspaces (atrophied cones), to total disappearance and fusion of choroidal epithelium with *limitans externa*. The *choroid* was thickened by œdema of its deep layers but showed no cell changes, and the chorio-capillaris, except that it was a little thickened, looked normal. There was no change of the elastic lamina. The *lens* was much altered. Its capsule was normal except that it was puckered at its central part in front. Within the capsule there was everywhere (except just at the equator) a thick layer of the same homogeneous coagulated effusion as occupied the vitreous and corneal chambers. *Immediately within* the anterior capsule, and between it and the before-named homogeneous albuminous effusion, was a layer of connective tissue nearly as thick as the iris and consisting of regularly laminated fibrous substance somewhat like the cornea. It began by a thin edge a short distance in front of the anterior termination of the suspensory ligament, and rapidly attained its full thickness which remained uniform until it reached the corresponding point on the opposite side of the front of the lens, where it ceased by a similar sharp edge. Just at its origin on each side the new tissue contained many oval and almost round cells which appeared to be continuous towards the equator with the capsular epithelium, and it is probable that they were derived from these. Elsewhere its corpuscles were long ovals contained in pointed spaces running parallel to its surface. Beneath this connective-tissue layer, but separated from it as before said by a quantity of albuminous substance, was a stratum of lens substance in which the nuclei were immensely increased in numbers, so that it looked like an ill-formed dimly-

fibrous substance thickly studded with small bluntly-oval corpuscles some of which had already become granular and fatty. This stratum was continued all round the lens. The parts next beneath this showed no increase in number of their nuclei but an alteration in shape and size, the nuclei often lying in large spaces of oval or spherical shape filled by hyaline highly-refracting substance, so that the space and its contained nucleus somewhat resembled a cartilage cell. The central parts of the lens showed no obvious changes, and here as in the part last described, the lens-fibres were well preserved. At the *equator of the lens* the capsule was only slightly and irregularly separated; there were in some sections irregular collections of nucleated round cells just within the capsule at this part, probably derived from its epithelium; in other sections masses of large globules, either oil or myeline, were observed. The suspensory ligament was diffusely infiltrated with round corpuscles like pus-cells. The *cornea* was perfectly healthy, as also was the *ciliary muscle*. There were a great many rust-coloured corpuscles of various sizes, and doubtless deriving their colour from blood in the thickened hyaloid at the back of the lens.

CASE IN WHICH DESTRUCTIVE ULCERATION OF CORNEA FOLLOWED THE REMOVAL OF A MALIGNANT WART ON ONE EYELID.

By W. Newman, M.D., Stamford.

On May 15, 1872, I applied silk ligature to a wart on left lower eyelid of a lady æt. 76, of feeble mental and bodily health. The wart had suddenly taken on rapid growth, and had all the appearances of epitheliomatous disease.

May 18. The growth dropped off, leaving small sore.

May 20. Surface nearly well; conjunctiva of left eye slightly red; cornea clear.

May 22. Cornea clear; eyelids not swollen. The maid speaks of some little discharge from between lids. It would appear to be of small amount.

May 25. Has not been so well the last two days. Of this I had heard nothing. Lower third of cornea occupied by sloughy ulcer; upper two-thirds clear. Abundant purulent discharge.

May 29. Has been much depressed; bad nights; free discharge; ulceration of cornea extending; hypopyon.

Dr. Taylor, of Nottingham, saw patient with me, and under chloroform performed upward iridectomy, incising also freely the chemosed conjunctiva.

The subsequent progress has been fairly good; the general health has improved, but the eye has shrunken, and there does not seem to be even perception of light.

I have put these brief notes on record as an illustration of the possible sequence of a very small operation on the eyelid. The ligature was selected from the difficulty of keeping the poor lady quiet.

A decided interval of apparent well-doing will be noticed between the removal of the growth and the onset of destructive mischief about the globe.

Part II.

A Periscope

OF

CONTEMPORARY OPHTHALMIC LITERATURE.

THE TREATMENT OF SQUINT AT THE DUTCH OPHTHALMIC HOSPITAL.*

Liebreich's plan of separating the conjunctiva and caruncle from the subjacent parts has been followed since 1867 in every case of considerable squint. Dr. Snellen finds that if the scissors are passed deeply under the conjunctiva, vessels of considerable size may be wounded, and if the capsule of Tenon is at the same time opened, the blood may pass into its cavity.

Jansje P., 10 years old, from Vlissingen (No. 297, 1867), had a convergent strabismus of the right eye. In the left one there was H $\frac{5}{5}$, and perfect acuteness of vision; whilst the sight of the deviated eye was so much impaired, that fingers could scarcely be counted. Besides the squint, there was a partially absorbed traumatic cataract in this eye. On the 2nd March, Dr. Snellen performed tenotomy on the right eye, without chloroform; the patient was very unsteady. The conjunctiva was freely dissected up under the caruncle: suddenly the expression of the eye changed, it projected so that the speculum became firmly fixed between the eye and the lids. Dr. Snellen passed a hook quickly under the tendon and divided its attachment. Blood was manifestly effused into the cellular tissue, yet attempts to let it out did not succeed. An accurately fitting pressure-bandage was immediately applied. The patient complained of a feeling of pressure, but had no pain then or afterwards. No symptoms of inflammation appeared: next day the protrusion was much less, the lower lid and parts around it were widely discoloured by blood which had spread along the subcutaneous cellular tissue. The further course was regular, and the position of the eye just as desired.

The same mishap occurred in another case. Geertje van H., 21 years old, from Hello (No. 490, 1867), had strabismus convergens of the left eye, nystagmus and maculæ corneæ in both

* From "De operatie van het scheelzien." Acad. proefschrift door S. J. Halbertsma, Utrecht, 1869.—Translated by Mr. T. Windsor.

eyes. The operation was performed on the left eye on the 27th April, without chloroform; the course was normal. Owing to the amount of the squint, the operation had to be performed on the other eye also. This was done on the 4th May without chloroform, the patient keeping perfectly steady. As the scissors were being used under the caruncle, the globe suddenly projected to a formidable degree; so far forwards indeed, that it was impossible to continue the operation. The speculum was removed with great difficulty from between the lids. A pressure-bandage was at once applied. The course afterwards was just as in the former case. Seven days later, the operation was repeated on the right eye, and the squint was perfectly cured.

Dr. Snellen remembered that he had cut, whilst pressing the scissors backwards, in both cases. Since then, he has always taken care, when dividing the cellular tissue under the caruncle, to keep the scissors forwards (away from the globe towards the inner surface of the conjunctiva), so that the caruncle and the conjunctiva are in some measure removed from the globe. With this precaution there have been no further cases of effusion of blood into the orbit.

Dr. Snellen has communicated to the author three cases in which the sclerotica has been wounded: in all of these sharp-pointed scissors had been used. The first case was that of a girl six years old. She was very unsteady when the conjunctiva was divided. On introducing the blunt hook, the operator found that it passed into the globe; the operation was not completed. The wound healed regularly. The vision remained as before. The child still squints.

The second was a case of divergent squint in a young lady of 14. The details of the operation are unknown. When she came, six months later, to Professor Donders, the vision of the wounded eye was reduced to one half, and there were slight opacities in the vitreous. Nothing else abnormal could be found. The operation was repeated on both eyes, with a satisfactory result. On the side of the injury the conjunctiva and the capsule of Tenon were closely united to the sclera.

In the third case the sclera was wounded in dividing the tendon. Violent inflammation was the consequence, and the sight of this eye was totally lost.

No such case has ever occurred at the Dutch Eye Hospital, where blunt-pointed scissors are used.

Dr. Snellen has operated latterly in the following manner:—The conjunctiva is freely divided in a direction parallel to and directly over the muscle: thus in convergent strabismus the incision would extend from the edge of the cornea towards the caruncle. Wounds in the conjunctiva parallel to the margin of the cornea are inclined to gape, especially when the eye is turned in the opposite direction; wounds vertical to the margin of the

cornea are, on the contrary, inclined to close when the eye is rotated in the opposite direction. If necessary, a suture can be applied without any fear of diminishing the effect of the operation. The operator next holds with forceps first one lip and then the other of the wound, and separates with blunt-pointed scissors the conjunctiva to an equal extent above and below. The caruncle is then held and treated in the same way. The closed forceps are placed between the edges of the wound on the middle of the muscle, opened, then gently pressed down and closed, thus inevitably seizing the muscle, into which a small aperture is now made close to the sclera. Two exactly equal incisions can now be made by inserting one blade of the scissors through the opening and the other between the muscle and the conjunctiva.

The advantages assigned are the following:—

1. The operation is easier. There is no risk of wounding the sclera (hence sharp-pointed scissors may be used so as to separate the attachment nearer to the globe). There is no danger of dividing Tenon's capsule too far in any direction.

2. The operation is less painful.

3. Extravasation of blood under the conjunctiva is prevented.

4. When desired, the capsule can be divided to a greater extent on one side so as to alter the action of the muscle.

A somewhat similar operation is proposed by Dr. Snellen for paralysis of the ocular muscles. "The conjunctival wound is in the direction of a meridian (from before backwards). The muscle is divided in the usual way, but a little further back than in tenotomy, so that a small piece of it remains attached to the sclera. Two sutures are now applied in the following way: through the upper edge of the wound in the conjunctiva, through the remnant of the tendon on the sclerotica, through the muscle drawn forwards, and again through the same edge of the wound in the conjunctiva. The second suture is inserted at the lower side exactly in the same way and parallel to the first. Both are now separately drawn tight and knotted. So made, they cannot possibly become loose too early. As the knots are on the outer side of the conjunctiva, the threads can be easily removed at any later period. The risk of inflammation may be lessened by separately uniting the conjunctival wound. It is not always necessary to divide the antagonist."

In his last chapter the author tabulates the operations which were performed at this hospital for strabismus in the years 1866—69.

VISIBLE PULSATION OF THE RETINAL VESSELS.

Otto Becker writes a long paper on the subject of visible pulsation of the retinal vessels. He examined the eyes of a series of

patients suffering from heart disease with the ophthalmoscope, and found that in cases of insufficiency of the aortic valves, spontaneous pulsation of the arteries on the disc and of the retina was almost always present. After making these observations, he had his attention called to a communication from H. Quincke on the same subject in the Berliner Klin. Woch. 1868, No. 34, and 1870, No. 21. These communications seem to have escaped the notice of ophthalmologists. He speaks of arterial, venous, and capillary pulsation in insufficiency of the aortic valves, the capillary pulsation being characterised by alternating pallor and redness of the disc when seen in the erect image. He only met with pulsation in marked cases of aortic disease, and did not always meet with it at each observation of the same case. Becker finds it in all cases and at all times. Sometimes, however, it is necessary to excite the circulation by letting the patient walk about or by giving a stimulant. At first he was unable to assure himself of the capillary pulsation, but latterly he had been able to do so. The filling of the trunks of the arteries and the emptying of the veins on the disc are synchronous with the cardiac systole. The arterial pulsation could also be seen in branches at a distance from the disc equal to three or four of its own diameters. He recommends that the observer's attention be directed to the light streak seen on the arteries. He will find that this increases in breadth, and, also, at the same time, the darker streaks on either side of it increase in breadth. The artery also increases in length, as may be seen by watching a curve. The pulsation can be seen best, and sometimes only, just before a large trunk gives off branches at a considerable angle. All these points are described in detail.

Notes of seventeen cases are given: the conclusion derived from them is that simple aortic insufficiency with or without hypertrophy of the left ventricle produces spontaneous pulsation of the arteries of the disc and of the retina. There was one exception. The patient was very anæmic, the radial pulse was small and soft. The anæmic condition probably accounted for the absence of retinal pulsation. In one case in which aortic insufficiency was diagnosed and no pulse was noticeable, the autopsy showed that no aortic insufficiency was present. In one case pulsation was noticed in the left eye, but was only discovered after close examination in the right. The diagnosis was of aneurism of the left carotid, chiefly, and of the innominate and arch of the aorta in a less degree. The feeble pulsation detected in the right eye was probably due to slight aortic insufficiency produced by the neighbouring aneurism.

He enters at length into the question as to what has hitherto been understood by the terms arterial and venous pulse. What has hitherto been designated as spontaneous, arterial, retinal pulsation would be better named intermittent flowing in of arterial

blood into the eye. The venous pulse may be said to be a "natural sphygmograph." It cannot be termed pulsation, in the ordinary meaning of the term venous pulse, that is, pulsation of the veins owing to insufficiency of the tricuspid valve. He has made experiments on the mesentery of frogs as to the calibre of arteries in which pulsation may be seen. In the largest of these arteries no pulsation could be detected, but there was a rythmical acceleration of the stream. The venous stream was continuous. Pulsation could easily be detected in an artery before it had left the intestinal wall, and before it split up into several branches. A drop of water applied intensified the pulsation. In cases in which he had formerly seen *arterial pulsation in the eyes of healthy individuals*, he had often explained it to himself as communicated from the veins, and therefore not synchronous with the radial pulse. He has lately, however, seen undoubted rythmical, arterial dilatation and elongation in the arteries of the disc and of the retina, in the eyes of perfectly healthy individuals. He gives cases. In one he could assign no cause; but in another case, recollecting his observations on the mesentery of frogs, he was led to surmise that the arrangement of the vessels was the cause. He gives a diagram. The trunk of the central artery passed forwards, without dividing, as far as, or beyond, the level of the retina towards the vitreous, and then gave off four branches about at right angles to each other. This arrangement probably afforded increased resistance to the flow of blood, and led to spontaneous pulsation. In the frog's mesentery in arteries of a certain calibre, no pulsation was visible, but if the slightest obstruction existed locally, then vessels of a small calibre were seen to pulsate. He also narrates a case of detached retina in which he saw pulsation in an artery, which was lifted up, when he confined his attention to a point just before its bifurcation. He discusses the question as to *why spontaneous pulsation is always present in aortic insufficiency*. In these cases the dilating pulse wave becomes exaggerated, and a sudden subsidence occurs owing to regurgitation into the left ventricle. Experiments are also described which were undertaken in dogs. The aortic valves were rendered incompetent. The following statement is made with reference to the *best means of ascertaining whether spontaneous pulsation is present or not*. It is more easily seen at a point just before a division occurs, and the more easily the greater is the angle at which the branch is given off. It is more frequently seen in the neighbourhood of the disc than in the periphery. The elongation of the artery, the increase of the length of a curve, and of the serpentine appearance, and the movement onwards of the artery, can be more easily seen in the periphery of the retina; in the smaller arteries therefore, and, under special circumstances only, on the disc. He enters in detail into the advantage of observing the light-streak on the

artery in estimating an increase in the breadth of the vessel, and also into the explanations which have been offered of the phenomenon of the light streak. He discusses the influence of increased pressure (by the finger, &c.) on the retinal vessels. The venous pulse and the arterial pulse in glaucoma are improperly so-called. The true arterial pulsation is really an intermittent flow of arterial blood into the eye; the venous pulse depends on the varying local pressure to which a stream of blood is subjected at different times. He confirms Mauthner's statement that the walls of the vessels on the disc and on the retina can be seen. This was almost always ascertained in the cases of aortic insufficiency.

In an appendix to his paper, Becker describes the phenomena of the circulation in the vessels of the disc in dogs to which attention has been called by others, and which he has also observed.

He also discusses the systolic blush and diastolic pallor of the optic disc, which he had only latterly succeeded in verifying. Owing to the practical skill in the use of the ophthalmoscope, and the willingness to see which are required in order to ascertain the presence of pulsation in the eye, the author is afraid it will yet be a long while before cases of aortic insufficiency will be diagnosed, first of all, by the ophthalmoscopist, as is so often the case with kidney disease, &c., now-a-days.—(Graefe's Archiv. 18 B. Abth. i, pp. 206—296.) (See *post* case by Fitzgerald.)

THE POSTERIOR LYMPH-PASSAGES OF THE EYE.

Dr. Julius Michel gives an account of the results of injections which he has made, accompanied by illustrations of the microscopic appearances, &c. He sums up to the effect that the sub-vaginal space communicates with the supra-vaginal space by means of slit-like gaps in the outer nerve-sheath and in the perichoroidal space by means of similar gaps in the sclerotic. The latter communicates by means of the perivascular spaces around the venæ verticosæ with Tenon's space; so that portions of injection which have passed, on the one hand, through the openings in the optic sheath, and, on the other hand, through those in the sclerotic, meet together in Tenon's space, or in the supra-vaginal space immediately connected with it. These spaces are all, since the researches of Schwalbe, to be regarded as lymph-spaces. The demonstration of the fact that the slits in the outer nerve-sheath and in the sclerotic, as described, represent means of communication between these spaces, and are lined with endothelial plates, justifies the opinion that they are to be regarded as serving for the passage of the lymph. The causes of certain forms of disease of the eye may be explained by the above facts, if the outflow from the lymph passages and spaces of the eye into the reservoir of the sub-dural space be obstructed on the one hand, and on the other, if the communica-

tion of the spaces with one another be partly interfered with. Such affections, for instance, as the complication of certain forms of neuritis with choroiditis may be so explained. Possibly also, the origin of myopia may be explained by the above facts in such cases as Kugel has noted. He observed myopia develop acutely after meningitis, and attributed the lengthening of the eyeball to the inability of the sclerotic to withstand the ordinary ocular pressure owing to changes which had taken place in it.—(Graefe's Archiv. f. Ophth., 18 B., Abth. 1, p. 127.)

PIGMENTARY DEPOSITS IN THE CORNEA.

Dr. Hirschler calls attention to a peculiar kind of deposit of pigment which he has met with in the cornea. His attention was first called to dark spots which he noticed appear in the corneæ during the retrogression of diffuse parenchymatous keratitis, and which he regarded as mere transparent portions, circumscribed gaps in the parenchymatous cloudiness. Later observations have induced him to think them accumulations of pigment in the deeper layers masked by the more superficial haze. In three corneæ which he had the opportunity of observing lately, he was convinced this was what occurred. He gives detailed notes of two cases. This pigment occurs in those places which are indicated by the presence of more numerous and larger newly-formed vessels, and therefore more particularly on parts near the centre of the cornea, and in small quantity in parts at a distance. It forms irregularly-margined spots or disks with four or more angles of the size of a small pin's head or 2 mm. (·08″) in diameter, or sometimes the spots may be quite circular. The colour is of a deep black, but when looked at from the front the deposits appear less deeply coloured, owing to the haze through which they are seen. If the latter is absent, then the black spots can scarcely escape observation in moderately clear daylight. By focal illumination under all circumstances they can be more closely examined. They are then seen to be situated about midway between the anterior and posterior surfaces of the cornea. When the infiltration of the cornea has become re-absorbed, these pigment deposits become so apparent that they may look like bits of coal-dust on the cornea. Under a magnifying power of 20 diameters, the deposits appear made up of a collection of several smaller spots. The centre of the spot is sometimes of a deep black, surrounded by a rusty-brown or deep-red circle; sometimes it is less deeply coloured than the periphery, and is then of a rusty-brown colour, making the whole spot resemble an irregular ring. In one spot, at a somewhat higher level, a deep-red border could be distinguished, but whether this was due to an effusion of blood or to a loop of vessels could not be determined. There can be no doubt that this

deposit of pigment originates from altered hæmatin, and consequently from antecedent effusion of blood into the parenchyma of the cornea. Additional evidence in favour of this was afforded by the presence of newly-formed vessels.

The two cases related, though differing in mode of appearance and in their course, agree with the typical examples of the affection in question, inasmuch as in both the disease began at the periphery and extended over the whole cornea, and deprived this for a long time of its transparency; that in both a rich vascularity appeared; and that, finally, the duration was very protracted. In both cases there was slight iritis. In one case a rather considerable corneal staphyloma in both eyes resulted from the keratitis. In both cases Pagenstecher's salve was used for more than a year. The pigmentation was first noticed after this remedy had been used for some time. The first patient was a man aged 24, who suffered from diffuse parenchymatous keratitis, serous iritis, and pigment deposits in both eyes. The second patient was a married woman aged 29, who suffered from parenchymatous keratitis, episcleritis, iritis of each eye, and pigment deposits in the left eye.—(Græfe's Archiv. f. Ophth., 18 B., Abth. 1, p. 186.) (See *post* Iritis Pigmentosa.)

METASTATIC IRIDO-CHOROIDITIS.

Prof. Hermann Schmidt relates two cases of metastatic irido-choroiditis attended with *the formation of a circumscribed collection of pus* after perforation of the sclerotic had taken place. He considers this to be a very rare occurrence. One patient came under care in the Charité Hospital at Marburg. The other was only seen a few times during life. The symptoms in the two cases were much the same. In the first case the patient had for long been the subject of phthisis, and was much reduced. His left eye was affected with irido-choroiditis. The most prominent symptoms were rather slight chemosis, and moderate protrusion of the eyeball. The cornea and the anterior chamber, excepting the presence of a very small hypopyon, were unaffected. The pupil was blocked up. Qualitative vision was lost. After some days, during which the chemosis and injection of the conjunctiva had, on the whole, diminished, a tumour of the size of a lentil or of a pea, and of yellowish colour, made its appearance at the inner canthus in the neighbourhood of the insertion of the internal rectus, and apparently situated close under the conjunctiva. An attempt was made to open the supposed abscess by a snip with a pair of scissors; but, after cutting through the conjunctiva and subjacent tissue, as no pus escaped, any further proceeding was abstained from. The inflammation gradually subsided, the tumour became very small, and the eye resumed its normal appearance, with the exception of the state of the pupil.

The sight was still lost. A few days later the patient died of tuberculosis. The subject of the second case was a man, aged 52, who was admitted for extensive suppuration of the left side of the neck, and suppurative inflammation of one knee-joint. The left eye had become inflamed the day previously, and showed evidences of iritis. He could distinguish the hands of a clock. On the fourth day moderate exophthalmos and slight œdema of the conjunctiva came on. On the ninth day the eyelids were slightly reddened and somewhat œdematous; the conjunctiva over its whole extent was abnormally injected and infiltrated with serum (chemosis). The eyeball was rather prominent. At the inner angle of the eye was a tumour, rather larger than a pea, projecting under the conjunctiva which, at one part, had a slightly yellowish colour. The cornea was clear, the anterior chamber tolerably transparent, but at the bottom was a hypopyon. The iris at the margin of the pupil was completely adherent all round, and the latter was covered over with a greyish membrane. The globe was rather more tense than natural, and, at some parts of the ciliary region, was sensitive to pressure. Vision was limited to quantitive perception of light. The diagnosis of suppurative irido-choroiditis was made. The nature of the boss-like tumour was doubtful. It might be a circumscribed inflammation and infiltration of the subjunctival tissues, or it might be a collection of pus encapsuled after perforation of the sclerotic. In neither case was an incision contra-indicated. A snip with the scissors did not let out any pus. On the fourteenth day a similar result followed another cut. In the meantime the œdema and the exophthalmos gradually subsided, and the anterior chamber became clearer. On the twenty-second day the patient died. The *post-mortem* revealed extensive suppuration in the left side of the neck, purulent inflammation of the right knee-joint and adjacent subcutaneous tissue: peri-articular abscesses in both elbows, and abscesses in the kidneys. In the left internal jugular vein was a suppurating broken-down clot, which passed up to the jugular fossa and into the left lateral sinus as far as the torcular herophili. The ophthalmic vein was not affected. Under the tendon of the left internal rectus, 7 mm. (·28″) from the corneal border was a tumour about the size of a pea, which, when cut into, proved to be an abscess cavity, communicating with the interior of the globe by an opening in the sclerotic. The walls of the abscess consisted of dense, strong, connective tissue. Its floor was formed by the sclerotic, which was rough and somewhat depressed, and it had the form of a triangle, whose apex passed towards the cornea. The perforation was almost in the middle of the triangle, and measured in diameter 2 mm. (·08″). Evidences of suppurative inflammation were found in the choroid and retina, the ciliary region and the vitreous, &c., and an exudation was found on Descemet's membrane. The optic nerve trunk

was normal, but its intra-ocular portion was smaller. A detailed description of the microscopic appearances is given. The examination confirmed the account given by Knapp (Metastatische Choroiditis Archiv. f. Ophth., 13 B., Abth. 1, p. 127). Important differences between the present case and Knapp's consisted in the high degree of intra-ocular optic neuritis, which was found, without special changes in the lamina cribrosa and the complication of the changes met with in Descemet's membrane. The most interesting peculiarity of all, however, was the perforation of the sclerotic, and the localisation of pus in a capsule externally. Cases of perforation of the sclerotic in choroiditis are quoted, but without localised collection of pus externally. Remarks are made on the classes of cases in which metastatic affections of the eye are met with. Special weight is attached to the fact that we commonly see this form of irido-choroiditis depending on emboli. In addition, the author makes a few remarks on the combination of the symptoms of one-sided exophthalmos, and of hyperæmia and œdema of the conjunctiva, of the orbital cellular tissue and of the eyelids as *indicative of thrombosis of the cerebral sinuses.* Various authors have asserted the pathognomonic character of this group of symptoms in reference to thrombosis. Prof. Schmidt thinks that not unfrequently the symptoms may be due to the choroiditis. In some cases it is certain that no irido-choroiditis has occurred. Knapp mentioned one symptom which has since been overlooked, which decisively excludes the presence of irido-choroiditis, namely, a wide and motionless pupil. It is only when combined with this symptom that exophthalmos, chemosis, and œdema of lids can be considered pathognomonic of thrombosis of the cerebral sinuses.—(Græfe's Archiv. f. Ophth., 18 B., Abth. 1, p. 18.)

GLAUCOMA.

L. Rydel contributes a paper on this subject. He details a case in which a man who had suffered from symptoms of glaucoma for three weeks, suddenly lost the sight completely in one night. He explains this as due to increase of pressure shutting off arterial supply and paralysing the retina. He agrees with Græfe that the blindness in acute glaucoma is due chiefly to ischaemic paralysis of the retina. The author thinks the same explanation applies to variations in chronic glaucoma. Cases of deep excavation with slight defect of sight are wholly exceptional, but possibly analogous to cases in which the brain becomes adapted to slow pressure. He discusses the question of concentric narrowing of the field. The defect beginning in the ends of the nerves at the outer half of the retina, he explains by the distribution of the vessels and the position of the disc. The inner half of the retina is more richly supplied with blood than

the outer, and the vessels to the outer half have a longer course. He quotes Poiseuille's laws as to the influence of the length and size of vessels on the quantity of blood passing through them. For the exceptional cases of glaucoma in which the temporal side of the field fails first, he has no explanation to offer. In regard to the subjective sensations of light of which amaurotic, glaucomatous patients complain, he remarks on the probability of their being explained by oscillations in the amount of blood-supply. At one time there is less pressure, as we know by the tension, more blood is supplied, and this irritates the nerve fibres. They may at the same time be quite unaffected by rays of light falling on them. He alludes, in passing, to the great changes which occur in the tension of glaucomatous eyes even within a few hours.—(Græfe's Archiv. f. Opht., 18 B., Abt. 1.)

NEURO-RETINITIS WITH CEREBRAL TUMOUR.

Dr. J. Rosenbach details at great length a case of neuro-retinitis with cerebral tumour (glioma). Illustrations of the results of the microscopic examination of the retina, &c., are given, and their bearings on the researches of Pagenstecher, &c. The patient was a man æt. 30. He had pain in the head, vomiting, drowsiness passing into coma, &c. The left eye was the one chiefly affected. The vision of the right eye was good (1 J., & $\frac{2}{40}$), and that of the left much diminished ($\frac{2}{200}$ & 3 J). The left disc was congested; its borders were ill-defined, and covered with a whitish haze, passing into the adjoining retina. The whole appeared swollen. The arteries were not narrowed; the veins were dilated and tortuous. Below and externally (inverted image) was a fine streak of hæmorrhage. The macula lutea was not altered. In the right eye there was a slight cloudiness about the disc. There was no albumen in the man's urine. Later on it was noticed that though he could pick up a pin, he could not mention the names of the largest letters. He died about two months after the commencement of the symptoms. The tumour was situated in the brain substance at the floor of the left lateral ventricle, pushing the corpus striatum forwards and the thalmus backwards, whereby pressure was exercised on the corpora quadrigemina. Between the floor of the lateral ventricle and the tuber cinerem it formed a mass which was well defined from surrounding parts. It was of a clear, yellowish-grey colour, and of somewhat harder consistence than that of the brain substance, the latter being softened and thinned. The tumour was a glioma. In the detailed account of the microscopic examination of the optic discs, &c., special attention is called to a *meshwork* which he found, resembling in some degree that of a bath-sponge, and of which he gives an illustration. The meshes were oval and divided from one another by septa of varying thickness. He

made many sections to ascertain whether this meshwork was formed by bundles of connective tissue pushed aside by hypertrophied nerve fibres, or whether they were due to exudation. He found they were filled with a finely-granular homogeneous substance, resembling coagulated lymph. The diameter of the spaces was from three to five times that of the thickest varicose nerve swellings. He particularises the fact that, besides the generally increased intra-cranial pressure, there was a special pressure exercised on the parts in and about the sella turcica by the tumour itself, and the floor of the lateral ventricle was pushed down by the increase in its contents, and that the left optic nerve, which was most compromised by the tumour, was the one most affected during life.

In answer to the question as to the exact connection between the tumour and the ocular changes in this special case, the author thinks there are several theories to choose from. He selects Herr Schmidt's, which depends on the pressure exercised on the contents of the fibrous sheaths of the optic nerve from the neighbourhood of the tuber cinereum. From this cause there results increased pressure on, and stowing of lymph between, the two sheaths and in the lamina cribrosa. A distension of the small vessels in the neighbourhood (disc, &c.), is a necessary consequence. The results of the removal of atmospheric pressure from any locality of the body may be adduced in comparison.—(Græfe's Archiv. f. Ophth., 18 B., Abt. i, p. 31.)

CONTRIBUTIONS TO OPHTHALMOTONOMETRY.

An elaborate paper, with tabulated summaries, on the tension of the eyeball under various conditions is communicated by Dr. Pflueger to the Archiv. für Ophth. and Otol., vol. ii, No. 2, pp. 91—153. He confirms the statement that, as a rule, atropine diminishes tension. That it increases tension except with iritic adhesions or in glaucoma, is highly questionable. In some few cases its effect does not become manifest.

THE OPHTHALMOSCOPIC IMAGE OF THE LARGE RETINAL VESSELS.

Dr. Schneller passes in review the explanations adopted by Jäger, Loring, and others. He is not satisfied with them. He attributes the light streak on the retinal vessels to a reflection, by the anterior wall of the vessel, of the image of the flame reflected by the mirror. He also enters into an explanation of the differences of the light streak as seen on arteries and veins. In a case of optic neuritis from lead poisoning he had been led to attribute the light streak to spasm of the vessels.—(Zehender's Klin. Monat., p. 240, 1871.) (Græfe's Archiv. f. Ophth., 18 B., Abth. i, p. 113.)

OPTIC NEURITIS FROM LEAD POISONING.

Dr. Schneller (Zehender's Klin Monat., 1871, p. 249) records a case of optic neuritis from lead poisoning. The patient was a house painter, æt. 44, strong, and of dark complexion, whose hair was turning gray. As an apprentice he had suffered from an attack of lead colic Four years previously he had had a chancre, not followed by any secondary symptoms. He was a smoker. Latterly he had been employed in grinding lead colours, without taking any precautions. Eight days before he had complained of defect of sight. He had M. l. $\frac{1}{50}$, r. $\frac{1}{25}$; V. l. $\frac{11}{100}$, r. $\frac{12}{20}$. Colours, so far as could be tested by coloured papers, were correctly distinguished. The peripheral field of vision was unaffected. The pupils were somewhat dilated. Ophthalmoscopically the discs were considerably reddened, not swollen, slightly hazy; the borders were a little indistinct (left, above, inner side and below, the right only below), being covered by a slightly reddish layer, which caused the retinal vessels to be almost imperceptible in places. The haziness only extended very slightly beyond the borders of the discs. The arteries were very tortuous; the veins resembled the arteries in thickness and appearance (having a central light streak and two red lateral ones) so much that they could only be distinguished from them with difficulty. In other respects the fundus in each eye seemed normal. There was a bluish line on the gums which appeared retracted from the teeth. After the applications of leeches on two occasions the sight did not improve. The treatment consisted in purgatives, iodide of potassium, protective glasses, and cessation from occupation. At the end of a month the patient resumed work without taking any precautions, and in spite of warning. In two months, date of last note, it is said the veins had gradually become dilated, and appeared more normal, that is, the light streak was less marked. The arteries were less tortuous, but more so than normal. The discs were paler, scarcely at all reddened or blurred at the margins. About eighteen months before, Dr. Schneller had seen a similar case in a painter. He had congestion of the discs and slight haziness, without dilatation of retinal vessels. He remarks that he considered the optic neuritis proved by the presence of redness, alteration in the margins of the disc, and slight cloudiness of its substance and the immediately adjoining retina. The second point distinguishes this form from choroidal hyperæmia, the third from that of simple hyperæmia of the discs.

That this optic neuritis proceeds from lead poisoning is proved by the occupation, the bluish-gray line on the gums, the costive stools, the grayish cachectic colour of the skin, the relapse on resuming the occupation without precaution, and the absence of other etiological influences. These peculiarities appear in con-

nection with tolerably marked congestion of the discs—without disease of the choroid and retina—with slight haziness of the optic disc, with slight differentiation between the veins and arteries, and with marked tortuosity of the arteries.

The changes in the veins, which, together with the tortuosity of the arteries, disappeared as the other symptoms receded, could not be due to thickening of the walls of the vessels, for there were no accompanying whitish streaks. Neither could they be due to diminution of the blood-pressure in the retinal arteries, as these did not contain less blood than usual. They are therefore to be ascribed to a morbid condition of the vascular muscular tissue, which is analogous to the symptoms of lead colic. This may produce a stagnation of blood and congestion of the capillaries and arteries of the retina, which may share in the congestion of the disc, and may at all events produce the tortuosity of the arteries, whilst it is not sufficient to dilate the arteries.

ENGORGED OPTIC DISC IN CONSEQUENCE OF SOLITARY TUBERCLE IN THE CEREBELLUM.

By Dr. Hirschberg. The patient was a girl, æt. 3 years. Headache, inclination of the head backwards, and to the right, drowsiness, languor, and inability to stand on her feet were the chief symptoms. The head gradually enlarged. In the right half of the cerebellum was found a hard, dry, yellow, cheesy mass, as large as an apple, composed of concentric laminæ, and containing at its centre a focus of white detritus. The left half of the cerebellum was attached to the basis cranii by means of a white cheesy mass as large as a walnut.—(Archives of Ophth. and Otol., vol. ii, No. 2, p. 26.)

ANATOMICAL RESEARCHES ON TYPICAL RETINITIS PIGMENTOSA.

Dr. Landolt narrates two cases of retinitis pigmentosa. The first patient was a man. In both eyes there were anterior and posterior polar cataracts, a few delicate films in the vitreous, complete atrophy of the optic nerves, the vessels were much diminished in size, their walls were partially apparent as white streaks, but in the periphery no vessels could be detected. The retina throughout the whole equatorial region, extending to the neighbourhood of the disc and some distance into the periphery, was beset with dark pigment arranged in the form of a network or of bone corpuscles. The layer of pigment epithelium was almost devoid of pigment. At isolated points only were there roundish or annular heaps of pigment. There was no evidence of exudation or other change underneath this layer. *His parents were not related*, and did not suffer from any eye disease, nor did

his brothers and sisters, with the exception of one sister who had become quite blind from glaucoma. The first symptoms were noticed when he was fourteen years old. He then suffered from hemeralopia, but could still read and write. When twenty years of age his sight only enabled him to find his way about. When seen, his vision only amounted to incomplete perception of light and dim vision of large objects. He could not distinguish people at all. He became very anæmic, and died of cirrhosis of the liver and kidneys. Careful microscopic examinations of the optic nerves, retinæ, &c., were made. The second patient was also a man, aged 39. The parents were not related, and no member of the family suffered from eye disease. He had always had defective sight, and from the age of eighteen had been completely blind. The ophthalmoscopic appearances were those of typical congenital retinitis pigmentosa. The patient became anæmic and dropsical. There was no apparent disease of the heart, and only a trace of albumen in the urine, and the latter gradually disappeared. At the *post-mortem*, general wasting, with chronic interstitial nephritis, &c., were found.

The following is a brief summary of the results of the examination of the two cases. The chief changes were found in the retina; almost total disappearance of the nervous elements and of the rods and cones; a very high degree of hyperplasia of the existing connective-tissue, and the formation of new connective-tissue in the connective-tissue frame work and in the walls of the vessels. The latter were much thickened, their calibre diminished and their finest ramifications completely degenerated into connective-tissue. Their walls contained masses of pigment which had either migrated from elsewhere, or was an endogenous production, and was partly enclosed in cells and partly free. The pigment had in great part vanished from the epithelial layer, and was collected in isolated positions along the course of the retinal vessels. In the choroid in the first case, thinning of the capillary vessels and pigmentary infiltration of the same were found, as well as an abnormal fusion of the layers together. The portion of the vitreous nearest to the retina was altered in structure, infiltrated with colourless blood-cells and with pigment granules, and in the second case, was too fluid. The lens was affected with polar cataract. These changes do not differ from those met with in other cases which have been examined. No glandular excrescences were found in the choroid, as described by Leber. The choroidal changes were very slight, and this fact showed that they were really cases of retinitis pigmentosa. The changes found, all pointed to a *chronic inflammatory process which was chiefly situate in the retina, and more particularly in the vessels of the retina*. The walls of the peripheral retinal vessels become inflamed, their connective tissue hypertrophied, and, at the same time also, hypertrophy of the surrounding connective-tissue is set

up. The nervous elements disappear, owing, at first, to pressure and, later, to failure of nutrition, dependent on narrowing of the calibre of the vessels. The retinal function is abolished. The process gradually encroaches on the central parts, the field of vision becomes narrower and narrower. No symptoms of stasis develop, because the process is so gradual. The morbid process extends more deeply, the epithelial layer immediately under the vessels becomes first affected, the pigment passes forwards along the passages of new connective-tissue formed by the inflammatory process. When once it has arrived at the wall of a vessel it may either pass further or form collections of pigment there. The latter occurs the more readily owing to the altered blood pigment present in the obliterated vessels. The further steps of the process are given in detail. The last of the inflammatory changes is the polar cataract, due probably to the abnormal state of nutrition of the vitreous. The choroid need not share in the process, but if we find glandular excrescences from the part lying immediately under the diseased retina, we need not be surprised. In the same way we are not astonished to find, as in the second case, that the walls of the choroidal vessels are affected in a similar way if once the disposition to inflammation of the walls of the vessels is present. The thickening of the walls of the retinal vessels found on microscopic and ophthalmoscopic examination tends to support the view that retinitis pigmentosa is a very chronic peri-vasculitis of the retinal vessels. The cases of retinitis pigmentosa without pigmentation support the same view. In these the process is confined to the inner layers of the retina, yet the objective and subjective results are the same. Perhaps the morbid process in retinitis pigmentosa may be compared to that in cirrhosis of the liver or kidneys. The first patient died of cirrhosis of the liver, the second of chronic interstitial nephritis associated with changes in the liver and spleen.

The author alludes to the results of the experiments of Dr. Berlin, who divided the optic nerves in frogs and guinea-pigs.—(Zehend. Klin. Monat. A., ix, s. 277.) Not only atrophy of the cell-elements of the retina followed, but also the pigment partially disappeared from the epithelial layer, and passed into the innermost portions of the retina. The changes were therefore similar to those met with in retinitis pigmentosa. There was no marked hypertrophy of the connective-tissue however, and the granular layers as well as the rods and cones were preserved. These experiments are perhaps rather of value as showing in what way the pigment may reach the retina. It must not be forgotten, however, that the vessels were divided at the same time as the optic nerve. The results of this double section cannot be estimated apart from one another. Illustrations accompany the paper.—(Graefe's Archiv. f. Ophth. 18 B. Abth., i, p. 325.)

EFFECTS OF DIVISION OF THE OPTIC NERVE.

Dr. Berlin spoke of division of the optic nerve. He had experimented on frogs and rabbits. His results were the same in each. He divided the nerve from the outside, by which means the ophthalmic artery, as well as the central artery of the retina, were simultaneously cut. The perfectness of this division may be ascertained with the ophthalmoscope, by the fact of the choroid losing its colour. The blood in the veins of the hyaloid membrane moves to and fro, dependent upon the respiratory movements, until, in a few days, the normal circulation is re-established. The pupil contracts immediately after the operation, but after the third day again dilates. From the second day on, marked changes in the fundus are perceptible; the latter becomes of a grayish-white, milky colour, the blood-vessels remaining distinctly visible. The retina is streaked very perceptibly in a radiating manner. The examination of the eyes, which was made at a varying length of time after the operation, showed the nerve fibres to be granular and the retina attenuated, particularly at the expense of the fibrous, ganglionic and molecular layers. The fibres of Müller resist the longest, and the rods always remain uninjured. The extent of the atrophy varied in different portions of the same retina. Throughout the whole retina the deposit of pigment was very large. This was accompanied step for step by a corresponding decolorisation of the choroidal epithelium, and hence was dependent upon the latter. No signs of inflammation of any kind appeared during the process of atrophy and pigmentation.—(Dr. Knapp's Report of German Ophth. Congress, Archives of Ophth. and Otol., vol. ii, No. 2, p. 194.)

A CASE OF FORMATION OF PIGMENT IN THE RETINA IN CONSEQUENCE OF RETINAL HÆMORRHAGES.

Dr. Hersing (Zehend. Klin. Monat. x, p. 171, with an illustration).

CASE OF CONGENITAL RETINITIS PIGMENTOSA.

Dr. Harlan records the case of a girl, æt. 18, who had always had defective vision. She had decided hemeralopia. The eyes oscillated constantly. The field of vision was very much contracted, and this explained her statement that she could often not see objects at all without looking at them from a distance, and then could only see distinctly by coming close to an object. At a distance she could obtain a general view indistinctly, whereas when she was close to an object her field was so contracted that she might miss it altogether. The image of a small object would completely occupy the sensitive part of the retina,

and could only be seen when it fell exactly on the macula lutea. The ophthalmoscope showed the changes characteristic of retinitis pigmentosa. There was no consanguinity between the parents, no history of hereditary blindness, and no indication of hereditary syphilis. The patient thought that her sight had improved rather than become more defective since childhood.—(Am. Journ. Med. Sci., July, 1872, p. 130.)

GENERAL CHRONIC HERPES ZOSTER—ATROPHY OF THE OPTIC NERVES—FURIOUS DELIRIUM.

Dr. Hubsch records an interesting case. The patient was a gentleman, æt. 52, at the date of the last note. He was born when his father was advanced in years, was at all periods old for his age, and became a distinguished linguist, &c. When forty years of age he suffered from pain in the back, at first located to one part, and relieved by friction or pressure, but in about a year extending widely. He could not bear the weight of his clothes, nor the friction of linen on the body. At last he noticed small rose-coloured elevations appear on the skin, of the size of a grain of sand or of a millet seed, arranged in groups taking a circular form, and of which each group, consisting of many hundreds joined together, formed a kind of ring. At first distinct, and scattered sparsely, here and there, these rings finally became greatly increased in number, packed closely together, fused into one another, and occupied a very extensive tract of skin. A patch of them of the size of the hand could be seen to cover part of the back, symmetrically, at an equal distance from the spine on either side. The appearance of the first two groups was preceded and accompanied by excruciating pain and hyperæsthesia of the skin. The eruption, consisting of hard elevations, pale at first, but gradually passing into a bright red colour, and becoming increased in size, so as to attain a height of a millimeter (·04″) above the level of the skin, generally terminated in exfoliation, the skin resuming its normal appearance. Each fresh outbreak was preceded by pain, which lasted 24—36 hours, when the skin became reddened and the eruption appeared. The groups would remain for three or four days, and then desquamate. The patches always appeared on both sides of the spine symmetrically. After a time the skin over the shoulder blades and over the sacrum became affected, and for a year the rash did not spread further. Then it appeared on the buttocks, thighs, abdomen, front of the thorax, the anus, fore-arms, and face in succession. MM. Hardy and Bazin, who saw the patient, gave no definite diagnosis. Professor Hebra designated it "chronic herpes zoster." The patient stayed some months in Vienna, and while there noticed that his sight was failing. He improved somewhat in other respects. M. Hubsch on his return (to Constantinople) found a posterior staphyloma in each eye, and also

commencing atrophy of the discs. The failure of sight proceeded rapidly. He was seen by v. Græfe, who confirmed the diagnosis of atrophy of the discs. The patient remained in a more or less quiescent state for six years more. Outbreaks of eruption of a similar character to the others occurred repeatedly. At the end of that time he lost appetite, his strength failed him, his spine became crooked, and he passed into a state bordering on stupefaction. After a time he became furiously delirious, a straight jacket had to be applied, and finally he was sent to an asylum. He lived on, with occasional intervals of calmness, till the time at which the communication was made.—(Annales d'Oculistique, Mai–Juin, 1872, p. 239.)

PARALYSIS OF THE TRIGEMINUS FOLLOWED BY SLOUGHING OF THE CORNEA.

Dr. Norris records the case of a man æt. 42, who applied for soreness of the left eye, of one week's duration. He had a large epithelioma of the left angle of the mouth. There was slight drooping of the lid, without other muscular paralysis; loss of sensation in the cornea, &c.; impairment of the sense of taste on the left side; slight paresis of the facial nerve on the same side; and marked deafness on the same side. The conjunctiva was congested, there was slight bullar chemosis and a punctate keratitis, most marked at the centre of the cornea. In a month the eye, in spite of all care, became worse, but then improved a little. In six weeks from his first coming under care, the epithelioma, which had existed for some months, was removed. The patient died a month later, at home, and no autopsy was allowed. The interest of the case lies in the fact that, though the patient was seen early, and in spite of the most sedulous care in cleansing the eye and protecting it from external irritants, necrosis and perforation of the central portion of the cornea could not be prevented. A summary of the researches and views of Græfe, Snellen, Meissner, Sinitzin, &c., is given.—(Am. Journ. Med. Sci., Jan., 1872, p. 80.)

ANOMALOUS CIRCULATION IN THE EYE.

Dr. Loring records three cases of anomalous circulation within the eye, probably produced by morbid processes. "It is certainly a very curious and, at the same time, very interesting fact that, though from the anatomical labours of Zinn, Jaeger, and Leber, an anastomosis between the choroidal and retinal vessels has been supposed to exist (at least, in the immediate neighbourhood of the nerve), no such anastomosis has ever been actually seen with the ophthalmoscope." The first patient was a young man, of sound bodily health, who came under care for

slight æsthenopia of one eye. The ophthalmoscopic appearances seemed, at first sight, to be those of rupture of the choroid, but ultimately the disease was considered syphilitic. It was not a congenital affection. There was a large patch of atrophy of the choroid at the region of the yellow spot, and evidences of past perivasculitis along the vessels. The most interesting feature was the remarkable behaviour of one of the lower principal veins. "This, as a glance at the plate will show, ascends towards the nerve in the normal manner till it reaches a point about two diameters of the disc from the edge of the nerve, where, instead of continuing on in the natural way, it makes a sudden bend at a comparatively acute angle, and then runs in the same direction with, and parallel to the neighbouring artery, the currents of the two vessels moving in the same direction. After making a sweeping curve upward, this part of the vein is joined by another large branch coming from the left of the field, and the two then uniting to form one trunk, this latter passes directly upwards, crosses over the artery, and then comes to an abrupt end, its point of termination being masked, in a provoking manner, to a considerable degree, by a spot of pigment lying over the vessel." As, however, neither the main trunk of the vessel, nor any branch thereof, makes its appearance in any part of the fundus, one of two things must take place, namely, either the vessel pierces the sclera, thus making for itself an independent exit from the eye into the orbital cavity, and uniting there with some orbital vessel, or it forms, sooner or later, some anastomosis inside of the eye with one of the larger choroidal vessels. If it be true, as Leber asserts, that there are no veins which empty out of the posterior part of the eye, then it is extremely improbable that this vessel should so far violate the law as not simply to enlarge an exit already existing, but to bore for itself an outlet through so dense and resisting a tissue as the sclera; while, on the contrary, there is certainly little against the supposition that the vessel should join one of the choroidal veins. "It is probable that the principal trunk of the vein lay in the very focus of the inflammatory action, and was by this completely destroyed, and subsequently absorbed down to the apex of the angle formed by the sudden bend in the vessel. Thus its connection with the nerve, as is obvious from the drawing, is entirely cut off for a considerable distance, not a vestige of the vessel or its remains being visible with the ophthalmoscope." That the venous current at one part flowed in just the opposite direction from what nature intended it should was undoubtedly the case. "Thus we have two exits for the venous circulation of the retina, one at the optic disc, the other at the seat of the injury." The second patient was a middle-aged woman, suffering from glaucoma. After iridectomy had been performed, "a deep gray opacity in the retina extended from the outer edge of the

optic nerve to the macula, which appeared as a blackish oval spot. Through this gray opacity, and occupying a part of the retina usually free from vessels, ran a branch from one of the principal trunks of the central artery. This vessel was of a considerable size, and pursued an exceedingly tortuous course, twisting in and out in a remarkable manner, till it finally doubled on itself, returning nearly to where it started from, and then passed out of view in the extremity of the field. In about the centre of the convoluted part this arterial branch was joined by a short trunk of about equal or a little larger calibre with itself, which seemed to come up in a sort of rounded arch-like projection from some vessel lying in the deeper tissues either of the retina or of the choroid, and by means of which the size of the tortuous vessel was increased, not only at the point of juncture, but also for quite a distance beyond." A figure is given.

The third patient was a young girl suffering from progressive myopia, the result of over-work at school. "The atrophy, as it progressed, had spared what either was originally, or had become a vein of considerable size. This vessel, taking its origin from the upper and inner part of the field, ran downwards and outwards, as if to pass out with or join one of the other vessels at the centre of the disc. After passing over the atrophied portion, however, and just before it reached the true border of the nerve, it made a sudden turn, and was then traceable directly into what was evidently a choroidal vessel. At the point of bending there was what seemed to be a faintly perceptible pulsation, and the lower portion of the vessel seemed to be on a plane posterior to its other portion, as if here the wall of the eye was, in fact, slightly staphylomatous." "Here, as in the first case, one of two things must hold good—either the vein pierces the sclera, and thus makes an outlet for itself, or it joins with one of the choroidal vessels, as really seemed with the ophthalmoscope to be the case."—(Archives of Ophth. and Otol., vol. ii, No. 2, p. 1.)

STRYCHNIA AS A RETINAL AND OPTIC NERVE STIMULUS.

Dr. Chisholm refers to papers by Prof. Nagel (contributed to *Centralblatt Dec.* 24, 1870, and *Berlin Med. Woch., No.* 6, 1871, analysed fully in *Med. Times and Gaz., Jan.* 21 *and April* 15, 1871) on strychnia as a remedial agent in amaurosis. The cures reported by Prof. Nagel seemed scarcely credible. Dr. Chisholm has often seen good result from administration of strychnia in hemeralopia. One patient who had been treated long and carefully by other physicians, who could not even see a gas light at night, after a few subcutaneous injections, was able to read a newspaper by the same gas light. Three patients presented themselves simultaneously, and were equally relieved by hypodermic injections of strychnia. Dr. Chisholm tried the

remedy in a case of extensive disease of the choroid and retina. The patient had applied for treatment on a previous occasion, and had been dismissed as hopelessly incurable. He was a man aged 52. The choroid and retina were extensively diseased. He could only distinguish light with one (the better) eye.

On the 16th of September one-fortieth of a grain of the sulphate of strychnia in ten minims of water, was injected under the skin of the arm night and morning. The effects were immediate. A few minutes after the very first injection, the enveloping fog seemed less to him. "After three days" the patient could see large objects about the ward, and "on the fourth day" of treatment, without help, he succeeded in walking through the streets home. At the end of six weeks, after having averaged, during that time, about three injections in forty-eight hours, and when the improvement in vision had been steadily progressing, he could make out the large type heading of the daily papers, and could walk alone in the streets. About two grains of strychnia had been used. In other cases of optic nerve atrophy, the effects have been as marked. Generally, Dr. Chisholm commences with a sixtieth of a grain gradually increased to a thirtieth twice daily. In no case has the last amount been exceeded. In functional disturbances the relief is very prompt; in organic mischief the results show themselves more slowly.—(Am. Journ. Med. Sci., Jan. 1872, p. 59.)

ON THE USE OF STRYCHNINE IN OPHTHALMIC PRACTICE.

Dr. Gori (Annales d'Oculistique, Sep.—Oct. 1872, p. 135).

HEREDITARY AFFECTIONS OF THE OPTIC NERVES.

Leber writes on cases of disease of the optic nerves in which the malady was inherited or due to congenital predisposition. No cases have been recorded in modern times excepting by Graefe and himself. He quotes the statements of the older authors in reference to "amaurosis," but of course the nature of the cases they described under that term included other lesions than those of the optic nerves. He details the histories of four families. 1. *Retro-ocular optic neuritis, central scotoma, hereditariness in a collateral line.* Five brothers were affected and two maternal uncles; a sister was not affected. 2. *Retro-ocular neuritis and neuro-retinitis in two brothers and one sister, partly acute, partly chronic—cure.* There were two other sisters and one brother unaffected. 3. *Retro-ocular neuritis in a brother and sister, resulting in a high degree of amblyopia from atrophy of the nerves.* Another brother and sister had no defect of sight. 4. *Central scotoma in consequence of retro-ocular neuritis, hereditariness in a collateral line.* No mention is made of the brothers and sisters, but it is

said that two maternal uncles suffered from the same affection. The total number of persons affected amounts to fifteen, but only nine of these were examined. If the cases mentioned by Graefe are added, we find that eighteen persons were affected in five families. A comparison of the cases examined shows that hereditary amaurosis depends on a *neuritis of the optic nerve trunk*, which commences either as a *retro-ocular neuritis*, or as a *neuro-retinitis*, and results in *partial*, or in rare cases, *total atrophy of the optic nerves*. The author then considers the symptoms which the disease produces, and more particularly *central scotoma; colour blindness;* the assertion of the patients that they see better *in the evening or in the shade* than in clear daylight, this applying also to cases, generally, of Graefe's retro-ocular neuritis; *subjective sensations of light and colours;* unusually marked variations in the amount of vision in two patients of the same family within a short time; the fact that both eyes were affected; the amount of vision remaining to the patients; and the applicability of the term retro-ocular neuritis to the cases. In some there was a decided affection of the optic disc and of the adjacent retina. As, however, these changes bore no relation to the gravity of the cases, and as, from other reasons, he concludes that the chief mischief was located in the trunk of the nerve, even for these cases the name retro-ocular neuritis is justifiable. At the same time the term *inflammation of the optic nerve trunk* would apply to all the cases, as it would not exclude an affection of the disc. The ophthalmoscope rarely showed a normal fundus. There frequently existed a slight haziness of the margins of the disc and hyperæmia of the vessels or even a distinct, but slight, neuro-retinitis, and often there were fine, white streaks along the vessels or patches of exudation on the disc. A figure of such a case is given. Once a considerable injection of the small retinal vessels was noticed, especially in the neighbourhood of the yellow spot. He particularly calls attention to the fact that the arteries in this stage were not smaller than natural, as is frequently the case in optic neuritis, but were either normal or even dilated. *In the later stages atrophy of the disc and moderate diminution in the size of the retinal vessels result.* The varieties of these conditions in different cases are described. *Etiology.*—In two of the families actual inheritance in a collateral line was noted. In the other two, and in Græfe's, there was only a congenital predisposition. The latter is closely connected to the former, and is evidenced by several members of the same generation being affected. Collateral inheritance is a connecting link between these two. Direct inheritance has not come under the author's notice, but instances are given amongst those cited. The parents were not related, before marriage, in any of the cases. As in two of the cases, the mother remained free whilst her brothers were affected, it would appear that men are more liable than women. In the first family

of six children, the only daughter alone remained unaffected. In the second, of three sons and three daughters, two daughters and one son escaped. In the third, of one son and three daughters, two daughters escaped. Women are not exempt. In each of the second and third families a daughter was affected, and in these instances it would appear that if women are attacked, the disease runs a more acute course or attains a higher degree of severity. In the cases quoted from older authorities (and therefore of a mixed kind), the proportion of women affected was larger. It is a question requiring further elucidation. *The age at which the patients were affected* varied in his cases from the thirteenth to the twenty-eighth year. The same variation occurred in the same family. In the family of which the history is given by Græfe, and also in the fourth of the present series, the individuals were attacked at nearly the same age (19—20). Travers notes the time of puberty, Sanson the age of 21, and Brown 16 to 17. Lucas mentions a notable instance of amaurosis attacking members of three generations at a successively earlier age in each (the grandmother at 35, the mother at 19, the children at 13 and 11). Other authors have noted cases as early as six and nine years of age, and others at later periods, the climacteric, or later still. In most of the author's cases other symptoms of slight nervous affections were present. *Result—Prognosis and Treatment.*—Notwithstanding the hereditary origin of the disease, the result is not always unfortunate. In some cases a cure practically results, only a slight amblyopia remaining. Even in the worst cases complete blindness does not result. If absolute blindness exists in the centre of the retina, a cure can only follow in recent cases. The prospect of restoration of vision in the affected parts is greater in proportion to the early stage of the disease, the slight degree of diminution of vision in the central scotoma, and the normal appearance of the optic disc. Complete pallor of the latter does not, however, exclude a restoration of vision. The prognosis seems more favourable in acute cases than in those which are slowly progressive. Moreover, there is undoubtedly a *difference in the degree of the malignancy of the affection in different families.* There is what may be termed a *genius morbi familiaris.* As regards treatment, the employment of mercurial inunctions is advocated. Græfe notes sweating as a curative means. Local blood-letting is discussed. The use of the constant current is spoken of favourably. Tonics and injections of strychnia were not found of any use. In conclusion, the author advocates the further trial of the constant current, the materials at command at present being insufficient to allow of a true estimate of its value being arrived at.—(Græfe's Archiv. f. Ophth., xvii, B. Abt., ii, pp. 249—291.)

DERMIC GRAFTING IN OPHTHALMIC SURGERY.

Dr. Wecker describes the plans of epidermic grafting advocated by M. Reverdin and by M. Ollier, and then passes on to one of his own which he calls dermic grafting. He pinches up a small fold of the skin of the arm, or of the fore-arm, between his thumb and index finger, and transfixes the base of it with a small bistoury. The piece of skin is seized with forceps and cut off at the base with a pair of curved scissors. He thus obtains small grafts which, when retracted, measure from 6 to 8 mm. (·24″—·32″) in different directions. These grafts are then applied to the wound and spread out carefully by means of a blunt probe. It is intended that the wound should be covered as completely as possible with a serrated mosaic of these pieces. The wounds of the lids or in their neighbourhood measure commonly only about 3—4 cent. (1·2″—1·6″), and require about 10 or 20 pieces to cover them. A piece of gummed goldbeater's skin is then placed over the wound, and this allows of a constant inspection of the condition of the grafts. A bandage is applied over the eyes to insure absolute immobility. The dressing is not changed for twenty-four hours. The change which occurs in the colour of the grafts indicates in a few days whether the result will be successful or not. Those pieces which adhere have a rosy colour at the end of 36 or 48 hours, gradually becoming red; whilst those which have not taken keep their palish yellow tint, become encircled with a brownish black ring, and finally mummify. It is remarkable that even beneath the mummified grafts when they become detached, it is found that cicatrisation has been completely established. In reality it is then discovered that only the epidermis has shrivelled up, and that the derma has become grafted. If any fail, however, it is an easy matter to fill up the gaps left in the mosaic. By this means suppuration is prevented, which is injurious to the other grafts. He does not hesitate to assert that covering a wound in a state of granulation "at the edges of which cicatrisation is commencing, or, at least, is about to commence" (Reverdin), with this kind of mosaic will at once check suppuration. The indications for the employment of grafting appear, at present, to be the following. 1. Grafting ought always to be employed in cases of burn of the eyelids or neighbouring parts which give rise to suppurating wounds, and by faulty cicatrisation, of which deformity or displacement of the eyelids would be caused. 2. It can be very advantageously employed in cases of partial or complete ectropion of the eyelids in consequence of cicatricial contraction in their neighbourhood (burns, caries, fractures, &c.). 3. Dermic grafting may, with advantage, take the place of almost all, if not all, blepharoplastic operations. 4. Grafting ought to be employed in all cases in which the eyelids have undergone a considerable loss of substance in consequence

of an accident or after operation, and a suppurating wound remains.—(Annales d'Oculistique, July—August, 1872, p. 62.)

THE OCULAR TREPHINE AND ITS APPLICATION.

Dr. Wecker describes a trephine which differs from the one shown at the London Congress by Mr. Bowman. He gives the following indications for its employment:—(*a.*) In cases of total cicatrisation of the cornea, especially when the lens has escaped, Dr. Wecker has removed a portion of cornea with the view of establishing a permanent fistula, and with a good result. (*b.*) In cases of absolute glaucoma, when the atrophy of the iris is so advanced that iridectomy cannot be practised, and simple sclerotomy is not sufficient, Dr. Wecker removes a circular portion of the cornea $1\frac{1}{2}$ mm. (·06″) in diameter at the corneal margin, so as neither to wound the lens nor to approach too near to the ciliary region. He does this to relieve pain and avoid enucleation.—(Annales d'Oculistique, Sept.—Oct., 1872, p. 137.)

OBSTINATE EXCESSIVE LACHRYMATION TREATED BY EXTIRPATION OF THE LACHRYMAL GLAND.

Dr. Talko records the case of a man, æt. 22, who had all his lifetime suffered from an overflow of tears on the left side. The duct was pervious. The lachrymal gland was excised. The man recovered and resumed his occupation. He could not himself appreciate any difference as regards the moisture of the two eyes. When examined, the eye which was operated on seemed rather the moister of the two. That the eye would not become dry was asserted for two reasons, first, because the palpebral portion of the gland was not removed; and, secondly, because it has been shewn that after the extirpation of both portions of the lachrymal gland no xerophthalmia results, the eye being moistened by the secretion of the Meibomian glands, &c. In the present case excitation of the remaining portion of gland by means of collodion, &c., caused a perceptible overflow of tears.—(Zehend. Klin. Monat., x, p. 17.)

A NEW METHOD OF ENUCLEATING THE EYEBALL.

Tillaux (Bull. de Thérap, 15 Juill., 1872, p. 24) describes the following plan:—The eyelids being held apart, the conjunctiva is seized with forceps at the outer part of the globe, and divided close to the cornea; then the tendon of the external rectus is cut at the surface of the sclerotic. Traction being made inwards with the forceps in the same position as before, the scissors are at once carried backwards, and the optic nerve easily found and divided close to its entrance into the globe. Finally, the posterior

half of the globe is seized with forceps and drawn out from behind forwards, bringing it in front of the conjunctival wound. The other muscles are thus rendered tense, and are easily divided.—(Annales d'Oculistique, Sept.—Oct., 1872, p. 182.)

ACCIDENTAL IRIDEREMIA, OR COMPLETE REMOVAL OF THE IRIS, BY THE FINGER NAIL OF AN ANTAGONIST.

Dr. Chisholm notes the case of a man, æt. 37, who presented himself for treatment on account of chronic inflammation of the left cornea. It was at once remarked that his two eyes presented a striking contrast. The left eye, for which he desired treatment, was of a bright blue colour, whilst the entire corneal portion of the right eye was black in colour, with the exception of a white triangular scar, $1\frac{1}{2}$ lines wide at its base, which rested upon the lower edge of the cornea, with the apex extending vertically a little beyond the pupillary margin. There was no iritic ring bordering the enlarged pupil. The eye looked, at first sight, as if it were quite blind from some old injury. A normal state of the fundus was found, however, on examining with the ophthalmoscope, and on questioning the man it appeared that this was his better eye. Three years before, he was engaged in a fight, during which his antagonist had gouged him in the right eye; he suffered no pain during the excitement of the row, and was not aware till the next day that his eye was injured. He then discovered the change in the colour of the eye, and detected a shred of membrane protruding from a scratch in the front of the eyeball. After one or two days this fragment, which was hanging out, came away, leaving a white scar over the sight. On the most careful examination, no trace of iris could be discovered. "When the thrust of the finger had driven the nail through the cornea, it had in some inexplicable manner entered the pupillary opening, and passing between the capsule of the lens and the iris, had thrust this latter membrane against the inner face of the cornea. Acting then as a hook, the finger nail had drawn the iris out of the corneal wound, detaching it from the ciliary ligament, the edge of the adhesion being weaker than the cohesion of the iris substance. The final escape of the protruding iris had been effected by the continued drawing action of the ever-winking eyelids. The finger nail had in no way injured the lens or the accommodation of the eye." The absence of the iris enabled rays to pass by the side of the corneal cicatrix. The eye was myopic; whether it had always been so was not certain. V. 1 J. at 4″ and 20 at 8′.—(Am. Journ. Med. Sci., July, 1872, p. 125.)

SEVERE OPHTHALMIA CAUSED BY EXPOSURE TO THE INTENSE LIGHT REFLECTED FROM THE DAZZLING SURFACE OF SNOW.

Dr. Gardner records cases in which ophthalmia, varying from a slight ephemeral character to a violent panophthalmitis, followed as the result of exposure to the intense light reflected from the surface of snow. The ophthalmia may destroy the eye at once, or leaves a condition which may do so secondarily. The author offers the following explanation of the way in which the eyes become affected. Under all conditions, except when the sun is very near the horizon, the eye is protected from its *direct* rays by the supra-orbital arch and eyebrow, but the snow on the ground, acting as a mirror, throws the *reflected* rays directly into the eye, and the cause acts with more constancy and severity to a pedestrian than to a person riding on horseback or in a covered sleigh, for the body of the sleigh intercepts the reflected light to a great extent, and the head and neck of the horse do the same to a certain extent. Usually, however, the severity of the cold or the condition of the roads makes walking the only means of travel where this disease most frequently prevails. Many travellers over snowy regions blacken the parts about the orbit with gunpowder dissolved in water. The Esquimaux use an opaque shield of wood or skin, which has a horizontal slit over the pupil to admit the light. Some of the Indians use an apparatus formed of two tubes of stiff buffalo hide, about two inches long and three-quarters of an inch in diameter, sewed firmly to a head-band of tanned hide, with openings for the tubes. These plans are equivalent to adding a diaphragm external to the iris. The pupil of course contracts on exposure to the strong light, but even the *smallest* opening so near the retina as is the pupil yet allows of so great illumination as to become a cause of disease. Dr. Gardner has devised goggles of hard rubber, shaped to fit over the orbit, and having over the pupil, in the axis of vision, a stenopæic opening, or a small oval opening whose long axis is placed transversely. He has found these quite efficient in preventing ophthalmia. Coloured glasses greatly annoy those who are not used to them by the discoloration of surrounding objects which they produce.—(Am. Journ. Med. Sci., April, 1871, p. 334.)

SARCOMA OF THE LOWER EYELID.

A boy, six years of age, was sent to Dr. Hirschberg for a large tumour of the lower eyelid. This was removed by an operation of which the details are fully given. The structure was that of a small-celled sarcoma. Figures of the appearance of the boy's face are given.—(Archives of Ophth. and Otol., vol. ii, No. 2, p. 14.)

A TEARSTONE IN THE CANALICULUS INFERIOR.

Dr. Pagenstecher records a case. The patient was a man aged 70. He had suffered from epiphora for long. There was a small tumour the size of a split pea. A grating sensation was felt in passing the point of a syringe down to it. An incision, &c., let out the concretion. A figure of the tearstone is given.—(Archives of Ophth. and Otol., vol. ii, No. 2, p. 219.)

TATTOOING OF THE CORNEA.

Dr. Wecker contributes a paper on this subject. He thinks that tattooing may be useful in certain cases instead of a stenopæic glass. He tattoos on six or eight different occasions so as to get a thoroughly black colour.—(Archives of Ophth. and Otol., vol. ii, No. 2, p. 224.)

JELLY-LIKE EXUDATION IN THE ANTERIOR CHAMBER.

Dr. Gunning records three cases in which he met with a jelly-like exudation in the anterior chamber. In one case it presented the appearance shown by a lens when dislocated into the anterior chamber. In two of the cases the origin was traced to syphilis, in the third to rheumatism. Prof. Schmidt has recorded two similar cases in the number for April—May, 1871, p. 94.—(Zehend. Klin. Monat., x, p. 7.)

DOUBLE, ISOLATED RUPTURE OF THE CHOROID.

Dr. Hersing records a case. The patient was a young man, and was under observation two years. One rupture passed through the yellow-spot region. The sight became almost wholly restored. The narrator is only aware of two other cases having been recorded. The patient saw straight lines as if curved in a particular way. An illustration of this is given.—(Zehend. Klin. Monat. x, p. 11.)

FISTULÆ OF THE LACHRYMAL CANALS.

Dr. Talko notes the case of a young soldier who had four openings into the lachrymal canals of one eye; two of them corresponded to the ordinary puncta, and the other two were fistulæ. They were clearly not of congenital origin, but had existed from childhood.—(Zehend. Klin. Monat., x, p. 23.)

ENTROPION SPASTICUM OPERATED ON BY A NEW METHOD, THAT OF PROF. SZOKALSKI.

Talko, Zehend. Klin. Monat. x, p. 25. This operation consists in cutting a rectangular flap, one side of which corresponds

to the border of the lid. From this flap, after dissecting it up as much as may be necessary (2—3‴), is snipped off, and the remainder stitched to the distal horizontal border of the wound.

AMOUNT OF ACCOMMODATION IN APHAKIA.

Prof. Förster, who writes on this subject, quotes cases recorded and tabulates them.—(Zehend. Klin. Monat., x, p. 39.)

PARALYSIS OF THE OCULOMOTORIUS IN ACUTE ARTICULAR RHEUMATISM.

Dr. Michel (Zehend. Klin. Monat., x, p. 167).

TRAUMATIC PARALYSIS OF ACCOMMODATION.

A young man was struck in the eye by a piece of iron chipped off from a tool he was working with. He came under the care of Dr. Harlan a few hours later. There was no pain and no external appearance of injury. No application had been made to the eye. The pupil was widely dilated. V = $\frac{20}{70}$ Sn. (injured eye) $\frac{20}{20}$ (sound eye). Small type could not be distinguished. He was hypermetropic $\frac{1}{48}$, and with + 48 glass he read $\frac{20}{20}$. Near vision was equally good with appropriate glass. The application of calabar bean contracted the pupil, and he could then read small print, but at a distance of eight inches only, and he required a concave glass to make vision perfect. The patient was not seen again.—(Am. Journ. Med. Sci., Jan. 1871, p. 139.)

CASES OF INJURY TO THE EYE.

Dr. Harlan records the following cases:—

Case 1.—*Blow on the eye—Rupture of sclero-corneal region—Escape of the lens and of the iris—Good vision with lenses.*—A lad æt. 15 was struck on the closed upper eyelid of the right eye with a tin horn thrown by a playmate. When seen, at the end of seven months, there was a slight cicatrix on the lid just above its ciliary margin, and there was an indistinct scar exactly at the sclero-corneal junction, occupying its lower and inner third. Not a vestige of the iris remained. Ophthalmoscopic examination showed a slight separation of the retina at the ora serrata at a point corresponding with the cicatrix in the eyeball. The lens was found to be absent. The vision unaided amounted only to quantitative perception of light, but with $3\frac{1}{2}$ convex glass V = $\frac{20}{30}$, and with + $2\frac{3}{4}$ the lad could read the smallest print. The rupture must have been by contre-coup. The external cicatrix was so indistinct that it escaped notice till the state of the ora serrata directed special attention to the part.

Case 2.—*Escape of greater part of the iris through a wound of the cornea, without injury to the lens.*

Case 3.—*Dislocation of the lens with myopia.*—Vision was improved by the absence of the lens.

Case 4.—*Injury to the eye from molten lead.*—The eye was lost.

Case 5.—*Injury from molten solder.*—The eyelids were glued together, but the eye was found uninjured.

Case 6.—*Injury to one eye—Sympathetic ophthalmia of the other after four years—Foreign body in the orbit.*—The patient was a boy aged 19. The blind eye was extirpated, and a piece of iron found imbedded in the orbital tissue. It was an eighth of an inch wide, and more than an inch long, and must have passed through the eye to reach its position behind it, and at the inner side of the internal rectus muscle. The surface was rough, and it was held so closely by the surrounding tissue, that it was found impossible to remove it till it was dissected out, almost like a piece of bone from its periosteum. The operation was followed by complete relief.

FOREIGN BODY IMPACTED FOR FIVE YEARS UNDER THE UPPER EYELID.

The patient was a man aged 42. He came to Dr. Monoyer for irritation of the right eye. On everting the upper eyelid a large foreign body dropped out. It was a "*crab's eye.*" He then recollected that he had been advised, five years before, to put a so-called "crab's eye,"* into his eye to drive away a small foreign body which was there. After he had put this in, he forgot all about it, and then in the morning imagined it had escaped during the night. His eye had been irritable at various times, but the irritation generally subsided when he rubbed the eyelid gently. If he rubbed too hard, a little pus would escape from the inner angle of the eye the day afterwards.—(Annales d'Oculistique, Nov.—Dec. 1872, p. 275, from Gaz. Med. de Strasb., 1872, Dec., p. 97.)

LARGE FOREIGN BODY IN THE ORBIT—EXTRACTION AT THE END OF TEN DAYS—SIGHT UNAFFECTED.

Dr. Borel notes the case of a woman aged 30, who had received a violent blow on the eye from her husband's pipe. The mouthpiece struck the eye. The husband threw the pipe away directly and it was not seen again. At the end of ten days an examination was made, and Dr. Borel withdrew *the amber mouth-piece* of the pipe, intact, from the orbit. It was about half-an-inch in breadth, and an inch and a-half in length.—(Annales d'Oculistique, Mai—Juin, 1872, p. 245.)

* *Cancrorum oculi, &c.*, Mayne.

EXTRACTION OF THE LENS IN ITS CAPSULE.

Terson (Revue Méd. de Toulouse, 1872, Nos. 3 and 4) advocates the removal of the lens in its capsule in certain cases. In 72 operations performed on Græfe's plan, he removed the lens and its capsule seven times. In two of these cases he removed the lens in its capsule intact. It is not always necessary to have recourse to forceps, &c. The ordinary pressure movements may be tried without lacerating the capsule. If the lens is hard throughout, it and its capsule may be seized with forceps. If the nucleus is surrounded by soft cortical matter, the forceps must be passed deeply. If the capsule gives way, the extraction must be completed in the ordinary way. The employment of a curette is dangerous as regards the vitreous.—(Annales d'Oculistique, Mai —Juin, 1872, p. 313.)

PASSIVE BLEPHAROSPASM INSTANTANEOUSLY CURED BY A VERY SIMPLE AND CURIOUS MEANS.

Dr. Monoyer relates the case of a girl aged six or seven years, who came home one day unable to open the left eye. The eyelids were closely shut together. At the end of three days, when she awoke from sleep, she opened both eyes. Three days later she again came home unable to open the left eye, and this condition then remained for another fortnight, when Dr. Monoyer saw her with the left eyelids closely shut and gently pressed together. He opened them with his fingers, and told the child to keep the eye open. She could not do so. He then *shut the other eye*, and opened the left, and told her to look straight at him. He then released the left eyelids, and they remained opened, and also when he allowed the right eyelids to open the left one remained opened. From that time the eyelids could be opened and shut by the child with ease.—(Annales d'Oculistique, Nov.—Dec., 1872, p. 267, from Gaz. Méd. de Strasb. 1872, Dec.)

BLEPHAROPLASTIC OPERATIONS.

H. Knapp, German Ophth. Congress (Report Archives of Ophth. and Otol., vol. ii, No. 2, p. 209).

A CASE OF MALFORMATION—THE EYES COVERED OVER WITH SKIN—KRYPTOPHTHALMOS.

Dr. Zehender describes and figures a case of malformation in which the eyes were concealed by a growth of skin over them. The child lived six months. It was probable there was perception of light. He is not aware of a similar malformation having been recorded, in which both eyeballs were present though pathologically changed, yet still comparatively perfect, and in which the

outer cutaneous covering was continued over the eyes. The post mortem examination is described by Professor Ackermann, and a detailed description of the eyeballs, &c., is given by Professor Manz. The eyelids and palpebral fissures were wholly wanting. Various interesting anomalies were found in the eyeballs.—(Zehender Klin. Monat., x, pp. 225—249.)

COLOBOMA OCULI.

Dr. Reich records a unique case of coloboma in the neighbourhood of the yellow spot, without coloboma iridis, or of any other part of the choroid or of the retina. He remarks on the whole subject of coloboma oculi.—(Zehend. Klin. Monat., x, p. 56.)

ON OSSIFICATION OF THE HUMAN CRYSTALLINE LENS.

Dr. Berthold narrates a case in which there appeared reason to think that the lens was ossified. Careful microscopic examination (given in detail) showed it was not so. He sums up that the choroid is the most frequent place of origin for ossification within the eye; that the iris may ossify, and the product be confounded with an ossified lens; that the ciliary body shows the least tendency to ossify; and that ossification of the human lens has not hitherto been proved.—(Græfe's Archiv. f. Ophth. 18 B. Abth. 1, p. 104.) (*See also* Knapp, *preceding Periscope.*)

SUDDEN OBLITERATION OF THE CENTRAL ARTERY OF THE RETINA.

A. Sichel (Arch. de Physiol. Paris, t. iv, 1872) gives an interesting example of embolism diagnosed during life and verified by the post mortem. The original is accompanied by a good chromolithographic plate.—(Annales d'Oculistique, Mai—Juin, 1872, p. 314.)

HYDATIDS IN THE FRONTAL SINUS, AND IN THE ORBIT—INCISION—EVACUATION OF THE HYDATIC CYSTS—CURE.

Verdalle records an interesting and obscure case.—(Bordeaux Médical, 8 Sept. 1872; Annales d'Oculistique, Sept.—Oct., 1872, p. 185.)

CYSTICERCUS CELLULOSÆ IN THE VITREOUS EXTRACTED WITHOUT IMPAIRMENT OF SIGHT RESULTING.

A case under the care of Dr. Hirchsberg is noted in the Annales d'Oculistique (Sept.—Oct., 1872, p. 141).

CYSTICERCUS INTRA-OCULARIS.

Dr. Hirchsberg records a case. The eyeball was excised. A figure is given.—(Archives of Ophth. and Otol., vol. ii, No. 2, p. 11.)

A CASE OF CYSTICERCUS WITHIN THE EYE.

A. Sichel records (Gaz. Hebd., 11th January, 1872, No. 2) a case in which he removed a cysticercus from the vitreous through a sclerotic incision. The pain, which had previously been horrible, ceased. The eye atrophied.—(Annales d'Oculistique, Mai—Juin, 1872, p. 314.) First case noted in France.

GLIOMA RETINÆ.

Dr. Hirschberg supplies three contributions, with narratives of cases, on the histology of glioma retinæ, which are contained in the Archives of Ophth. and Otol., vol. ii, No. 2, pp. 18, 21, 29, with illustrations.

INTRA-OCULAR TUMOURS.

Dr. H. Z. Gill narrates cases of intra-ocular tumours, and gives illustrations of the macro- and microscopic appearances. He appends a tabular statement, which we have modified.

No.	Variety.	Age. Duration.	Result after Operation.
1....	Melano-sarcoma .	60 years. Few weeks.	No return in the orbit, but the patient died, one year and a few days later, "with all the symptoms of cancer of the liver."
2....	Glioma	2½ years. Not stated.	Died in 4 months.
3....	White sarcoma ..	19 years. Some time.	No return in 16 months.
4....	Melano sarcoma .	35 years. 15 months.	Death in 8 months.
5....	Glioma	2½ years. Not stated.	Died in 4 months.
6....	Glioma	2½ years. Not stated.	Died 7 months later.
7....	Glioma	5 yrs. 10 mo. One year.	Died in 1 month.

DR. DELAFIELD.

No.	Variety.	Age. Duration.	Result after Operation.
1....	Glioma	18 months. 3 months.	No return for 2 months.
2....	„	4 years. 2 years.	Died within a year.
3....	„	4 years. 8 months.	Died within a year.
4....	„	2 years. 1 year.	Died within 3 months.
5....	„	2½ years. 6 months.	Died in 3 months.

PROFESSOR KNAPP.

1....	Glioma	18 weeks.	Died in 2 years.
2....	„	4 years.	Died in 4 weeks.
3....	„	2½ years.	Died in 3 months.
4....	„	2 years.	Died in 2½ months.
5....	„	2½ years.	Died in 3½ months.
6....	„	2½ years.	Probably died.

Dr. Gill remarks that the prognosis in glioma retinæ is almost entirely dependent on the extent of the disease, as marked by the sclerotic capsule. If the disease has extended so as to involve the orbital contents to any considerable extent, operative procedures are but palliative. The statistics given show a most discouraging mortality, if no better results can be obtained. In all Dr. Gill's cases the disease was far advanced before the operation. The seat of origin of glioma may be in any layer of the retina, anterior or posterior. The manner of origin is obscure. The place of origin is most commonly the inner granular layer.—(Pamphlet reprinted from the St. Louis Med. and Surg. Journ.)

RETINAL TUMOURS WITH SHORT PEDICLES.

Dr. Pagenstecher, Germ. Oph. Congress. (Report by Dr. Knapp, Archives of Ophth. and Otol., vol. ii, No. 2, p. 214.)

FIBROMA OF THE SCLEROTIC.

Prof. Saemisch, of Bonn, records a case. The patient was a girl, ten years of age. Symptoms had been noticed for a year. The symptoms, when she came under care, appeared to be those of an intra-ocular tumour which had perforated backwards. There was a yellowish-gray reflex to be made out through the pupil, which was widely dilated. The tension was increased, and the eyeball projected somewhat. Enucleation revealed that the posterior half of the bulb inwards from the optic nerve was the seat of a dense tumour mass. The section of the nerve was normal. On section of the eyeball, a few drops of a thick yellow material, resembling thick pus, and consisting of round nuclei, escaped. The lens was pressed forward, and the whole retina detached. The vitreous chamber was obliterated. In the region of the optic disc, and further outward, the choroid was united with the retina in a broad solid mass, 2 mm. (·08″) in thickness. The subretinal space was filled with a pulpy, compact mass of a yellow colour. No vessels could be found. From the optic entrance, inward, a tumour, 10 mm. (·4″) long, 8 mm. (·32″) wide, and 5 mm. (·20″) thick, was located upon the outer surface of the sclera, extending to the optic nerve, and so intimately attached to the, elsewhere, unchanged sclera, whose inner surface at the affected place was entirely normal, that the outer surface could not be distinguished from the substance of the tumour. The results of the microscopic examination are given in detail. Changes were found in the retina and choroid. The tumour consisted of a fibrous connective tissue which in torn preparations appeared extremely wavy and interspersed with here more, there fewer, cellular elements, which exhibited the development of fibre from round cells in all phases; so that here was a connective-tissue neoplasm in luxuriant growth. "The anatomical diagnosis was accordingly extra-ocular fibroma of the sclera and a circumscribed intra-ocular fibroid degeneration of the choroid and retina." In reference to the question of reconciling the clinical diagnosis, before removal, with the anatomical condition discovered afterwards, Dr. Saemisch says: "The diagnosis of glioma rested on the following morbid phenomena:—1. Increased hardness of the globe, together with other data evincing increased intra-ocular tension, as congestion of the anterior ciliary veins, flattening of the anterior chamber, dilatation of the pupil, &c. 2. Abolition of function, with the peculiar yellowish reflex from the two masses behind the lens, which must be considered as solid. 3. The age of the patient. 4. That the visual disturbance had been observed a year previously, but had gradually increased to total blindness lately, and coincidently with severe pain and protrusion of the eye. This circumstance justified the supposition that the glioma had increased rapidly

within a short time, and become extra-bulbular." "No one would suppose that the two elevations were produced by a total detachment of the retina and such a quantity of thick pus in the sub-retinal space as to give them a yellow tint, because, in this case, the changes which usually accompany the collection of so much pus in the interior of the globe were absent, viz., swelling of the lids, chemosis, discoloration of the iris, turbidity of the aqueous, and, perhaps, also, hypopyon." "If the tumour were primarily extra-bulbular, with limitation of visual power later and in consequence of pressure upon the optic nerve, we should have expected the appearance of diplopia amongst the functional lesions." "The visual disturbance, in consequence of the growth of a tumour near the optic nerve, was perhaps considerable from the first, without the patient having sufficiently distinguished the diplopia. This I believe to be the probability." "As far as I know, this is a unique case of fibroma of the sclera developing upon the posterior section of that membrane, and at the same time it furnishes evidence that the subject of ocular tumours, to which so much attention has been given of late, is not yet fully elucidated."—(Archives of Ophth. and Otol., vol. ii, No. 2, p. 304.)

CYSTS OF THE IRIS—A CASE OF PENETRATING WOUND OF THE CORNEA WITH EYELASHES IN THE ANTERIOR CHAMBER, AND SUBSEQUENT FORMATION OF A CYST IN THE IRIS.

The cyst was of the nature of a pearly cholesteatoma. Dr. Rothmund quotes all the cases of cysts of the iris he can find recorded, 37 in number. In 28 there was a history of injury. Total excision of the cyst is the proper treatment. In seven out of twenty-two of such operations a bad result followed. The sight is generally much impaired or lost. The greater number of the cysts were serous; some were gelatinous, and some epidermoid. The cysts originate for the most part in consequence of wounds. The epidermal cysts certainly arise from injury, and, indeed, from implantation of cutis or of cells of the hair follicles. The other kinds possibly originate from detached, implanted, epithelial cells from the conjunctival covering of the cornea, or, as Wecker states, from the gradual encysting of a portion of the iris in consequence of the wound, and, in that case, the cyst contents consist only of aqueous humour.—(Zehend. Klin. Monat., x, pp. 189—223, with illustrations.)

PEARLY OR CHOLESTEATOMATOUS EPITHELIOMA OF THE IRIS.

Dr. Monoyer records (Gazette Med. de Strasbourg, 1872, 1st Juin) a case of double, pearly epithelioma of the iris following on a wound of the eye, in which extraction of the larger tumour

was practised. Panophthalmitis followed. The case is given in detail, and an account of the microscopic examination is added. He criticises Dr. Rothmund's views. Lastly, he recommends that when a solid tumour, having its seat in the anterior chamber, has to be removed, the old flap incision should be adopted in preference to a linear incision, inasmuch as the first alone gives the operator facility for enlarging the corneal wound to the necessary extent.—(Annales d'Oculistique, Mai—Juin, 1872, p. 249.)

HERPES ZOSTER CORNEÆ.

Prof. Horner remarked that this term has never been correctly defined, and is by no means identical with the phlyctenular keratitis, which is described by Stellwag under the name of "herpes corneæ." The "herpes zoster corneæ" begins with collections of clear vesicles, arranged in the form of a wreath upon the cornea. After these rupture there appears an irregular loss of substance beneath, as if it were the result of a scratch. The cornea soon becomes opaque, and is usually insensible throughout its whole extent. The course is slow, and the regeneration of the epithelium especially is very gradual. The tension of the globe is never markedly lessened. The retina is the seat of venous hyperæmia. There is another form of the affection very similar to the one just described, but in which the tension of the globe and the sensibility of the cornea are not especially altered. Horner observed 31 cases of herpes corneæ in the course of the year, and in many there was present, at the same time, herpes of the lips and cheeks. In most of the cases the affection of the eye was preceded by some general constitutional disorder, as pneumonia, intermittent fever, or the like. The average age of the patients was 35 years. A few cases were cured in two weeks, but the most lasted one and a half to two months. The disease is, with rare exceptions, monocular, and manifests no tendency to complications with iritis, nor to recurrence. Nagel saw the same complication of symptoms in a case where there was but a single vesicle. The case healed rapidly under the application of the constant current after other means had failed. Horner had also seen cases where the vesicles appeared in the centre of the cornea, and were few in number. Hypodermic injections of morphia are to be recommended for the purpose of allaying the pain, and the opening of the vesicles somewhat lessens the pain also. Von Græfe, from a verbal communication, was accustomed in this affection to dust calomel into the eye. Warm poultices act unfavourably, but a protecting bandage and instillation of atropine are, on the contrary, to be recommended.—(Knapp's Report of German Ophth. Cong., Archives of Ophth. and Otol., vol. ii, No. 2, p. 197.)

GENUINE HERPES OF THE CORNEA.

Dr. Schmidt records two cases. There was no complication with any internal malady, such as that to which Horner has called attention.—(Zehend. Klin. Monat., x, p. 163.)

DIVERGENT STRABISMUS.

Dr. Loring, jr., writes on divergent strabismus, and more especially with reference to its treatment by operation. He thinks that the plan of bringing forward the internal rectus, though for a time fallen into discredit, is the one from which most advantage results. It is generally stated that myopia is the most frequent cause of divergent strabismus, and if we take this in its broadest sense as applying to absolute, relative, and dynamic squint, this statement is undoubtedly correct. Nevertheless it is comparatively rare in simple myopia, even of the highest grades, that we see that degree of divergence which produces the greatest deformity. It is in hypermetropia that we meet with the greatest amount of divergence, in cases in which an operation for convergent strabismus has been performed. In simple myopia the strabismus is rather relative than absolute. This no doubt depends on the fact that as the eyeball increases in length the power of both internal and external recti is diminished, so that though, in such eyes, a certain amount of insufficiency, or even relative divergent strabismus, for even moderately near objects is produced, we generally have, at the same time, a certain amount of insufficiency of the external recti for distance, or, at any rate, we seldom get that amount of absolute divergence mentioned above, for the simple reason that the externi have not the power to produce it. Dr. Loring thinks that unequal refraction of the two eyes is a powerful cause of divergent strabismus. Take, for example, emmetropia in one eye and hypermetropia in the other. The amount of effort required to produce convergence of the emmetropic eye must be greater than that for the shorter (hypermetropic) eye. This effort being made, the hypermetropic eye will be influenced to the same extent, more than is necessary, and will converge too strongly. If, now, an operation be performed, and both internal recti be divided, the emmetropic eye, as far as its muscles are concerned, is in the condition of a myopic one, a certain amount of insufficiency is produced, and when the eyes are directed on a near object, if one be covered it will make spasmodic efforts at convergence followed by an associated movement outwards. Thus we have a dynamic squint produced, which soon increases, and causes a bad kind of asthenopia. It is in these cases that advancement of the internal rectus is most indicated. Various methods have of late been advocated, chiefly by Graefe, Critchett, Agnew, and

Liebreich. Loring describes the different methods, and mentions the cases in which each seems most available. He points out that when the tendon of the internal rectus is stitched forwards by sutures placed in the vertical meridian above and below the cornea, not in the transverse line of the middle of the cornea, there is great liability of rotating the eye by dragging too much on the upper or lower suture. This causes very distressing vertical diplopia without the eye is very amblyopic. Dr. Knapp only operates on one eye. Dr. Loring would agree with those who divide both external recti; the effect is divided, the excessive shortening of the internal rectus is avoided, and the movements of the eyeball are not so much diminished. A diagram illustrates these points. The squinting eye, having an absolute divergence, can never fix an object without the other eye makes a corresponding, associated movement outwards. Even when the patient is under the influence of chloroform, after the internal rectus has been brought forward, the other eye will be found to have made an associated movement outwards. Dr. Loring describes Knapp's and Græfe's operations for slighter degrees in which it is not necessary to advance the internal rectus. We should be cautious as to bringing forward the internal recti in cases in which advancement of the myopia is threatened, for, by increasing the tension of these muscles, we may again set up mischief which had become quiescent. Among the inconveniences of the operation may be noted a disturbance of accommodation. Dr. Loring has seen a case in which artificial myopia or spasm of the ciliary muscle was produced, the eye previous to operation being emmetropic, and afterwards myopic, $\frac{1}{24}$. This yielded to atropine, but recurred when the atropine was left off.—(Am. Journ. Med. Sci., April, 1871, p. 325.)

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A new Apparatus for Testing the Field of Vision.—Dr. Scherk (Zehend. Klin. Monat., x, p. 151, with an illustration). A hollow hemisphere, the inside of which is mapped out into divisions, which are numbered.

The size of the Field of Vision with different degrees of Refraction.—Dr. W. Dobrowolsky (Zehend. Klin. Monat, x, p. 159).

A new method of estimating the Ocular Optic Constants.—Drs. Mandelstamm and Schöler write on this subject, and describe and figure a new instrument. The paper deals with (1) *The estimation of the distance of the plane of the pupil from the apex of the cornea;* and (2) *The estimation of the radius of the curvature of the anterior surface of the lens.*—(Græfe's Archiv. für Ophth., 18 B., Abth. 1, p. 155.)

VISIBLE PULSATION OF THE ARTERIA CENTRALIS RETINÆ IN A CASE OF INCOMPETENCY OF THE AORTIC VALVES.

C. E. Fitzgerald records a case in a man aged 40. Only the indirect method of examination was used; the pulsation was only noticed in a portion of the superior (inverted image) branch of the arteria centralis, extending from its point of emergence to where it crossed over one of the veins, and only in one eye, the right.—(Brit. Med. Journ., Dec. 23, 1871.)

IRITIS PIGMENTOSA.

C. Ritter details the case of a woman, æt. 52, whose right eye had been defective after a blow three years before. The cornea was slightly opaque. Behind the cloudy layers two completely black points could be seen in the layers immediately adjoining Descemet's membrane. Both were at the lower part of the cornea; the layer was about a millimeter (·04″) in diameter. The black colour was extreme. There was no vascularity. The iris structure itself was not diseased, but there were numerous adhesions to the lens capsule. They were very black. The disease originated, in great part at least, in the pigment layer; the other eye was quite healthy. He thinks that the pigment must have travelled from the iris. If, as Hirschler states (see *antea*), the pigment were derived from hæmatin, it would not resemble "coal dust," it would be of a reddish-brown colour; whereas the tint, in his case and in Hirschler's cases, resembled that of iris pigment exactly. He comments on the symptoms of iritis present in Hirschler's cases.—(Zehend. Klin. Monat., x, p. 303.)

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